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Proposed Minimum Standards for Training Tractor-Trailer Drivers

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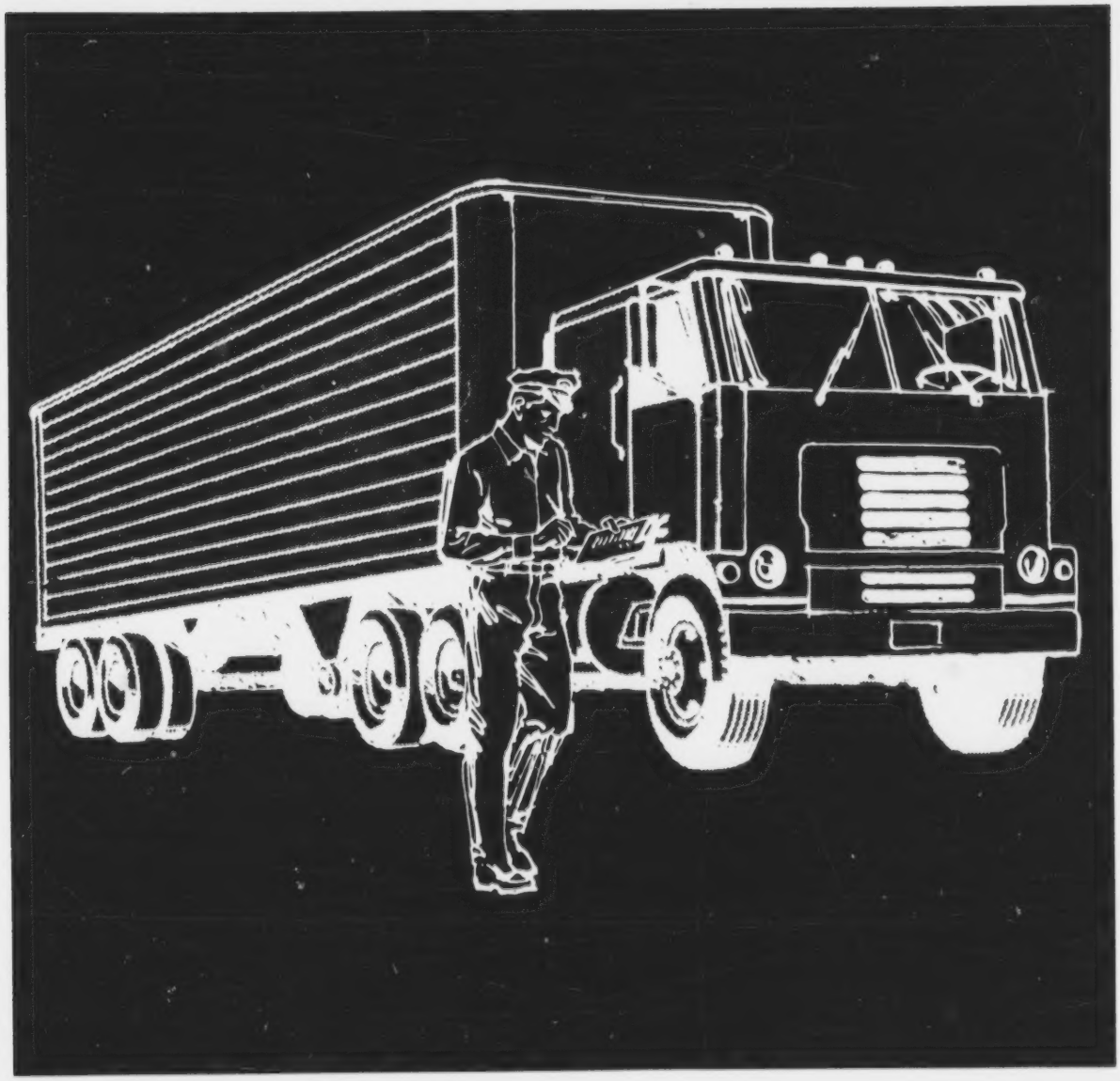

U.S. Department of Transportation
Federal Highway Administration

Proposed Minimum Standards for Training Tractor-Trailer Drivers

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Bureau of Motor Carrier Safety

1985

U.S. Department
of Transportation
**Federal Highway
Administration**

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INTRODUCTION

Better trained tractor-trailer drivers can reduce the number of accidents on our highways, which is the purpose of this manual. These Proposed Minimum Training Standards were developed by the U.S. Department of Transportation's Federal Highway Administration's Bureau of Motor Carrier Safety to provide such driver training programs with standardized minimum curriculum requirements, training materials, vehicles, facilities, and instructor hiring practices.

The Proposed Minimum Training Standards, referred to as the Standards, are the synthesis of investigations and extensive research projects conducted by and for the Bureau of Motor Carrier Safety, reflecting the current state-of-the-art for training novice tractor-trailer drivers. The Standards are not meant to stand alone; a comprehensive sample model training curriculum based on the Standards will be published later in 1984.

The curriculum, and the other recommendations in the curriculum manuals, can improve tractor-trailer driver skills. However, it must be emphasized that the provisions of the Standards are intended to serve as a guide to be used at the discretion of the reader and should not be construed as mandatory requirements. It must also be emphasized that the Bureau of Motor Carrier Safety does not intend to promulgate regulations based on these training Standards.

The curriculum is designed to serve several purposes. First, it is to be used as an illustration of these Standards to provide greater clarity and understanding of their purposes and intent. To have attempted to set forth the full details of all aspects of these Standards would have required a voluminous document. Thus, the reader may refer to the applicable portion of the curriculum for further amplification of the Standards.

The second reason for the curriculum was to provide a completely functional, working model of a curriculum that would serve the above purpose, as well as to provide a sample of a curriculum that would meet the minimum requirements of these Standards. Therefore, the reader will find that all aspects of a training curriculum have been addressed, including the following:

- o Student Manual:
  - Pre-class study materials
  - In-class training aids
  - Post-school reference material
- o Instructor Manual:
  - 72 complete, ready to use, lesson plans
  - Sequence of training and lesson prerequisites
  - Training objectives for each lesson
  - Visual training aids for each lesson
  - Equipment/materials requirement for each lesson
  - Student progress tests
  - Remedial training techniques

- School Administrator Manual:
  - Curriculum content
  - Instructor selection
  - Instructor training
  - Instructor supervision
  - Instructor assignment prerequisites
  - Equipment, supplies, and materials required
  - Facilities and motor vehicles needed
  - Student recruitment suggestions
  - Student selection guidance
  - Student supervision (for safety)
  - Student graduation requirements
  - Student placement suggestions
  - Recordkeeping for student certification

The third reason for development of a model curriculum was to provide those training organizations which lacked either the funds or the expertise to develop their own curriculums with a working model. Such organizations can use the curriculum and be assured that they are automatically in full compliance with the Standards.

It should be emphasized that as the Standards are minimum standards, the model curriculum is to be considered a basic or "core type" of curriculum. The amount of additional training a student may require, if any, will depend upon the individual student's capacity to learn; how much the school expands/enhances the curriculum; and the quality of instruction. Therefore, all schools are urged to evaluate carefully the specific job requirements for which their student(s) are being trained and to add all necessary material to the curriculum to insure that the student(s) meet those job requirements safely and efficiently.

OVERVIEW OF THE STANDARDS

Four basic goals comprise these Standards:

- Student safety during training.
- Ability to drive safely.
- Ability to drive legally.
- Ability to drive efficiently.

To achieve these goals, the Standards specify minimum requirements for the training of tractor-trailer drivers, including subjects to be taught; instructional objectives to be attained; the number of hours necessary for the attainment of each of the objectives; and the required equipment, vehicles and facilities necessary to obtain these instructional objectives.

ORGANIZATION OF THE STANDARDS

The minimum training Standards are organized as follows:

1. General Curriculum Standards:
    - o Curriculum content
    - o Instructional sequence
    - o Instructional objectives
    - o Instructional methods
    - o Minimum hours of instruction
2. Curriculum Unit Standards:
    - o Specific requirements for each of the 29 units of instruction
3. Training Schedule Standards
4. Instructor Qualification Standards
5. Training Equipment and Materials Standards
6. School Facilities Standards
7. Student/Instructor Ratio Standards
8. Student Enrollment Standards
9. Student Evaluation Standards
10. Student Graduation Standards
11. Student Placement Standards
12. Student Training Certification System
13. Miscellaneous Standards

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We also wish to express appreciation to the hundreds of individuals, consultants, research organizations, truck driver training schools (for hire and private motor carriers), vehicle and vehicle component manufacturers, and State and Federal agencies which contributed so much to this project.

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GENERAL CURRICULUM STANDARDS

OVERVIEW

The General Curriculum Standards recommended by BMCS provide a basic instructional program for training tractor-trailer drivers. This section contains an overview of the curriculum subjects; instructional sequence, objectives, and methods; and the minimum number of hours necessary for accomplishing the objectives of these Standards.

This curriculum is designed for students who are already licensed as automobile drivers. Therefore, many of the traditional subjects found in other driver training courses are not included.

ORGANIZATION

The curriculum is divided into Sections, Units, and Lessons. Five sections of instruction are used, with each section containing from three to nine units and each unit containing two or more lessons. In the five sections, a total of 29 units and 72 lessons are presented.

Sections

Each section has different objectives:

Section 1 - Basic Operation-This section covers the interaction between students and the vehicle. It is intended to teach students to control the motion of the vehicle, ensure it is in proper operating condition, and correctly coupled to trailers.

Section 2 - Safe Operating Practices-This section covers the interaction between the student/vehicle combination and the highway traffic environment. It is intended to teach students to apply their basic operating skills in a way that ensures their own safety and that of other road users.

Section 3 - Advanced Operating Practices-This section covers the higher level skills needed to cope with the hazards of the roadway-traffic environment. Its purpose is to develop perceptual skills needed to recognize the potential hazard as well as the manipulative skills needed to handle the vehicle in an emergency.

Section 4 - Vehicle Maintenance-This section covers the manner in which the various components of the vehicle work so students can recognize a malfunction or safety hazard before it causes serious damage or an accident. Its purpose is to teach students to perform routine service functions and simple maintenance tasks, and to recognize when the vehicle needs repairs.

Section 5 - Nonvehicle Activities-This section covers activities not directly related to the vehicle. Its purpose is to teach students to carry out these activities in a way that protects their safety and the safety of the vehicle, cargo and other motorists.

Units and Lessons

A unit is a set of instructional activities, with the same instructional objectives, and is divided into lessons. A course outline follows which contains an overview of the 29 units and 72 lessons. Lessons are divided into the following categories by the type of activity used to instruct students:

Classroom Lessons-Classroom instruction occurs indoors, accomplished by instructional aids that allow large numbers of students to be taught effectively at one time.

Lab Lessons-Laboratory instruction refers to any instruction occurring outside of a classroom that does not involve actual operation of the vehicle or its components. It may take place in a parking lot, garage, or facility owned by a dealer or fleet operator.

Range Lessons-Range instruction is instruction that occurs on a protected off-street "Driving Range," where students may make use of tractor-trailers without hazard from cars or other road users. Those schools that lack access to off-street facilities may conduct range instruction on public property, provided adequate control of other traffic is available to avoid danger to students, instructors, or other road users.

Street Lessons-Street instruction refers to behind-the-wheel (BTW) instruction that occurs in roadway configurations and traffic conditions needed to satisfy the objectives of the lessons for which the instruction is required.

NOTE: No lesson involves more than a single mode.

COURSE OUTLINE

Section 1--Basic Operation

Purpose
To introduce students to curriculum components of the tractor-trailer and basic maneuvers
At end of section, students will have acquired the skill and knowledge to operate a tractor-trailer combination well enough to begin on-street driving lessons

Unit 1.1 Orientation
Introduces student to course content and vehicle through classroom lecture

Instructor points out key components of tractor-trailer in demonstration

Lesson 1 - Orientation to Tractor-Trailer Driver Training, Classroom
Lesson 2 - Introduction to the Tractor-Trailer, Classroom
Lesson 3 - Orientation to the Tractor-Trailer, Lab

Unit 1.2 Control Systems

Introduces students to function, operation and meaning of instruments and controls, e.g., gear shift, tachometer, etc.
Instructor points out controls, instruments and their operation during demonstration

Lesson 1 - Introduction to Vehicle Instruments and Controls, Classroom
Lesson 2 - Instrument and Control Familiarization, Lab

Unit 1.3 Vehicle Inspections

Detailed classroom instruction on how to inspect tractor-trailer before operating, while in operation, and at the end of a trip
Instructor will demonstrate pre-trip inspection
Students will practice and continue practicing throughout course

Lesson 1 - Vehicle Inspections: Procedures, Classroom
Lesson 2 - Vehicle Inspections: Practice, Lab

Unit 1.4 Basic Control

Students introduced to basic vehicle operation and concepts in class
Instructor demonstrates starting, stopping, backing with students
Students take turns at controls of a tractor-trailer
Students gain initial practice in basic control on range

Lesson 1 - Introduction to Basic Control Maneuvers, Classroom
Lesson 2 - Starting and Turning Off the Engine, Range
Lesson 3 - Putting the Vehicle in Motion, Range
Lesson 4 - Turning the Tractor-Trailer, Range

Unit 1.5 Shifting

Students introduced to basic gear shifting procedures and shift patterns for most common tractor transmissions
Instructor demonstrates shifting on range
Students practice shifting up through the first three gears

Lesson 1 - Shifting Procedures, Classroom
Lesson 2 - Development of Shifting Skills, Range

Unit 1.6 Backing

Students introduced in classroom to methods and concepts of backing a tractor-trailer

Instructor demonstrates and students practice variety of backing exercises on range

Lesson 1 - Backing Procedures, Classroom
Lesson 2 - Development of Backing Skills, Range

Unit 1.7 Coupling and Uncoupling

Students introduced to procedures for safely coupling and uncoupling a tractor-trailer

Instructor demonstrates coupling and uncoupling procedures and students begin practice under supervised conditions

Students develop proficiency throughout course by performing activity before and after street session

Lesson 1 - Coupling and Uncoupling Procedures, Classroom
Lesson 2 - Coupling and Uncoupling Skills, Range

Unit 1.8 Proficiency Development: Basic Control

All skills learned in units 1.2 - 1.6 practiced

A series of basic exercises are practiced on the range until students develop sufficient proficiency to drive on street

Initial on-street practice occurs after sufficient proficiency is developed on range

Lesson 1 - Introduction to Proficiency Development Exercises, Classroom
Lesson 2 - Proficiency Development Exercises, Range
Lesson 3 - Proficiency Development: Practice in Basic Control, Street

Unit 1.9 Special Rigs

Handling and operational characteristics of vehicles on which students are not trained are discussed in class, e.g., tankers, refrigerated vehicles

Field trip taken to observe special rigs and special rigs observed during all on-street practice

Lesson 1 - Characteristics of Special Rigs, Classroom
Lesson 2 - Observation of Special Rigs, Lab*

Section 2--Safe Operating Practices

Purpose
To allow students to learn and practice safe operation techniques in highway traffic

Unit 2.1 Visual Search
Classroom instruction on the principles of visual search
Range instruction on the use of mirrors
On-street practice in use of visual search techniques

Lesson 1 - Visual Search Principles, Classroom
Lesson 2 - Use of Mirrors, Lab
Lesson 3 - Application of Visual Search, Street

Unit 2.2 Communication
Classroom instruction on communication, e.g., signaling, use of horn, etc.
On-street practice in communication techniques in variety of settings

Lesson 1 - Principles of Communication, Classroom
Lesson 2 - Application of Communication, Street

Unit 2.3 Speed Management
Classroom instruction on speed management principles, e.g., maintaining safe speed in variety of situations, operating on hills, curves, etc.

Lesson 1 - Speed Management Principles, Classroom
Lesson 2 - Speed Management Demonstration, Range

Unit 2.4 Space Management
Classroom instruction on principles of managing space in traffic, e.g., following distances, space to the sides and rear, passing, etc.
On-street driving practice in space management techniques

Lesson 1 - Space Management Principles, Classroom
Lesson 2 - Application of Space Management, Street

Unit 2.5 Night Operation
Classroom instruction on inspection at night, preparation for night operation, hazards of night driving, and actual operations at night
Range practice inspecting vehicle at night
On-street lessons requiring application of night driving principles

Lesson 1 - Night Operation, Classroom
Lesson 2 - Night Operation: Basic Maneuvers, Range
Lesson 3 - Night Operation: On-street, Street

Unit 2.6 Extreme Driving Conditions
Classroom instruction on driving in cold and hot weather, stormy conditions, mountainous terrains
Practice in putting on chains and towing a stuck vehicle

Lesson 1 - Operation During Extreme Driving Conditions, Classroom
Lesson 2 - Techniques Used During Extreme Conditions, Range

Unit 2.7 Proficiency Development: Safe Operating Procedures
All safe driving practices from units 2.1 through 2.5 (and unit 2.6 if applicable) practiced as students develop proficiency

Lesson 1 - Procedures for Safe Operation, Classroom
Lesson 2 - Practice in Safe Operation, Street

Section 3--Advanced Operating Practices

Purpose
To enable students to acquire the advanced skills needed to handle hazards and emergencies

Unit 3.1 Hazard Perception
Classroom instruction and exercises in recognizing hazards early enough to prevent them from becoming emergencies
On-street driving sessions involving application of hazard recognition principles

Lesson 1 - Recognizing Hazards, Classroom
Lesson 2 - Application of Hazard Recognition, Street

Unit 3.2 Emergency Maneuvers
Classroom discussion of emergency braking techniques, evasive actions and responses to other emergencies
Emergency stopping and evasive actions practiced on range

Lesson 1 - Emergency Procedures, Classroom
Lesson 2 - Emergency Skills, Range

Unit 3.3 Skid Control and Recovery
Classroom instruction on causes of skidding and jackknifing and techniques for avoiding and recovering from skids, jackknifes
Student practice recovering from skids in skid pan exercises

Lesson 1 - Techniques of Skid Control and Recovery, Classroom
Lesson 2 - Skid Control and Recovery Exercises, Range*

Section 4--Vehicle Maintenance

Purpose

To prepare students to recognize causes of vehicle malfunctions and to perform simple maintenance and simple emergency repairs

Unit 4.1 Vehicle Systems

Classroom instruction on function and operation of all key vehicle systems, e.g., engine, engine auxiliary systems, brakes, drive train, coupling systems, suspension, etc.

Instructor gives detailed description of each system, its importance to safe and efficient operation and what is needed to keep system in good operating condition

Lesson 1 - Vehicle Systems, Classroom
Lesson 2 - Vehicle Systems Demonstration, Lab

Unit 4.2 Preventive Maintenance and Servicing

Supervised student practice in vehicle servicing, including checking engine fluids, changing fuses, checking tire inflation, changing tires, draining air tanks and adjusting brakes, performing emergency repairs

Lesson 1 - Nature and Importance of Preventive Maintenance, Classroom
Lesson 2 - Engine Fluids, Filters, Lights and Fuses, Lab
Lesson 3 - Changing Tires and Checking Tire Air Pressure, Lab
Lesson 4 - Reservoir Drainage and Brake Adjustment, Lab

Unit 4.3 Diagnosing and Reporting Malfunctions

Classroom instruction on identification of vehicle malfunctions

Students given a series of exercises in which they troubleshoot problems

Students practice emergency starting procedures

Lesson 1 - Diagnosing and Reporting Malfunctions, Classroom
Lesson 2 - Emergency Starting Procedures, Lab

Section 5--Nonvehicle Activities

Purpose

To enable students to carry out those activities not directly

related to the vehicle that professional drivers must perform

Unit 5.1 Handling Cargo

Basic principles of loading and unloading cargo, including weight distribution and techniques for securing and covering cargo

Students practice loading a vehicle under instructor's supervision

Students visit local freight handling company to observe operations

Lesson 1 - Basic Cargo Handling Procedures and Requirements, Classroom
Lesson 2 - Techniques for Loading, Securing, and Unloading Cargo, Classroom
Lesson 3 - Demonstration of Cargo Securement, Lab
Lesson 4 - Observation of Cargo Handling Operations, Lab*

Unit 5.2 Cargo Documentation

Discussion of basic forms and procedures required when driver handles cargo, e.g., bills of lading and other freight documentation

Basic procedures and responsibilities for placarding vehicles that carry hazardous materials

Lesson 1 - Cargo Documentation: Basic Forms and Procedures, Classroom
Lesson 2 - Cargo Documentation Problems, Classroom

Unit 5.3 Hours of Service Requirements

Classroom instruction in permissible hours of duty, rest periods, etc.

Introduction to and practice using driver log to record time

Use of log to record time for remainder of course

Lesson 1 - Basic Requirements of Hours of Service Regulations, Classroom
Lesson 2 - Complying with the Hours of Service Regulations, Classroom
Lesson 3 - Log Keeping Exercise, Classroom

Unit 5.4 Accident Procedures

Basic instructions for handling the scene of an accident, reporting accidents, rules and regulations related to accidents

Introduction to basic first aid practices*

Introduction to use of fire extinguishers and basic fire-fighting techniques, especially those related to truckers, e.g., tire fires

Demonstration of use of fire extinguisher

Lesson 1 - Accidents and Accident Reporting, Classroom
Lesson 2 - Principles of First Aid, Classroom*
Lesson 3 - Fires and Firefighting, Classroom
Lesson 4 - Firefighting Demonstration, Classroom or Lab

Unit 5.5 Personal Health and Safety
Physical requirements for driving an interstate vehicle, medical examination and certification
Discussion of basic health maintenance requirement, diet, exercise, use of alcohol, drugs and avoidance of fatigue
Discussion of common nondriving safety hazards and use of special equipment, e.g., gloves, hard hats, goggles, equipment used with hazardous material

Lesson 1 - Personal Health and Driving, Classroom
Lesson 2 - Safety Equipment and Practices, Classroom
Lesson 3 - The Truck Driver's Environment, Classroom

Unit 5.6 Trip Planning
Class discussion of importance of and requirements for planning trips
Federal and State requirements, including need for permits, vehicle size and weight limitations, etc.
Classroom exercise in which students plan an overnight trip with school vehicle, including identification of permits, estimating time of arrival, fuel stops, etc.

Lesson 1 - Trip Analysis and Trip Procedures, Classroom
Lesson 2 - Trip Planning Exercise, Classroom

Unit 5.7 Public and Employer Relations
Classroom instruction and discussion on maintaining a good image, public relations problems of trucking industry, dealing with public and customers
Classroom instruction and discussion of relationship to employer, including how to look for a job, get a job and keep a job
Student practice interviewing for a job

Lesson 1 - The Driver's Role in Public Relations, Classroom
Lesson 2 - Employer Relations, Classroom**

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* - indicates an optional lesson.

** - indicates portion of lesson is optional.

Please refer to the appropriate Curriculum Unit Standards for details on optional lessons.

MINIMUM CURRICULUM REQUIREMENTS

The units in this course outline are mandatory under these Standards. The lessons are not required if all of the instructional objectives for each Curriculum Unit Standard are satisfied fully.

Instructional Sequence

The units may be taught in any sequence that leads to efficient learning. The first three sections form a natural learning sequence beginning with basic control of the vehicle's motion (section 1), then the needs of the highway traffic environment (section 2), and, finally, introducing the advanced skills (section 3), that can be acquired only after mastery of the more fundamental skills.

Units of sections 4 and 5 are independent and can be taught in any sequence. Because they involve classroom and laboratory instruction for the most part, they may be scheduled concurrently with the behind-the-wheel (BTW) instruction of sections 1-3 to make the best use of school equipment and facilities.

INSTRUCTIONAL OBJECTIVES

Objectives of instruction are provided at the beginning of each Curriculum Unit Standard. They are not divided among individual lessons as the various classroom, lab, range, and street lessons are all applied toward attaining the same objectives.

Purpose of Objectives

The purpose of the objectives is to make instructional goals for each unit explicit. The objectives describe the performances that students are expected to be capable of performing after completing the unit, as well as the knowledge, skills, and attitudes they must possess to attain performance objectives. Making the objectives explicit is intended to enable the user of these Standards to

- gain a clear understanding of instructional goals necessary to fulfill training standards.
- be able to communicate to instructors what is expected of the instructors.
- be in a position to modify training to meet local needs and changing times and remain in compliance with these Standards.

Nature of Objectives

The objectives in the Curriculum Unit Standards describe the performance, knowledge, skills, and attitudes needed to assure safe operation of tractor-trailers. They are not to be confused with "behavioral objectives" sometimes included in lesson plans that describe a system of measuring student achievement, e.g., "the student must describe...," "the student must be able to list...," etc. These behavioral objectives are inappropriate for use in these Standards for the following reasons:

- There are many important curriculum objectives that cannot be measured within an instructional setting, including objectives concerned with alcohol, drugs, personal health, preventing fatigue, and actual use of safety practices, such as keeping logs and visual search practices.

- It is not feasible to measure all aspects of instruction so that behavioral objectives only sample from instructional content. Listing only the sample of content to be measured fails to communicate a complete picture of the instructional objectives.

- Identifying the specific measures that will be used to assess student achievement allows students to concentrate their preparation on those aspects of content to the neglect of others.

- Accurate measurement of student performance, knowledge, skill, and attitude requires far more precise definition of the conditions of measurement, performance to be observed, and criteria of proficiency than can be practically encompassed in a statement of objectives.

Behavioral objectives are not effective communication tools for students, administrators, or anyone seeking to update or improve the training program because they do not describe adequately training goals. Behavioral objectives are not often used for measurement purposes. Most instructors assess student proficiencies through written and performance tests that bear little resemblance to the behavioral objectives.

The following describes the nature of objectives that appear in the Curriculum Unit Standards, including performance, knowledge, skill, and attitude.

Performance Objectives

Performance objectives specify the performances that students are expected to exhibit as a result of unit instruction. The nature of the Curriculum Unit Standards is that students can be expected to exhibit actual tractor-trailer driving performance on the basis of unit instruction. Therefore, all unit performance objectives are "terminal" objectives. There is no need for intermediate objectives to serve as steps to the attainment of higher objectives, a characteristic of training programs that deal with more complex behavior.

Performance objectives may be divided into two types: enabling and assurance objectives.

Enabling Objectives. A type of objective involving performances that students are not capable of carrying out prior to instruction and for which instruction plays an enabling role. In the Curriculum Unit Standards, such objectives are specified by the phrase "student must be able to."

- Students must be able to back into an alley dock.
- Students must be able to align the tractor properly to connect with the trailer.

Assurance Objectives. Many of the performances the Curriculum Unit Standards specify are ones that students are capable of, but which for various reasons they often do not carry out. The objective of such instruction is primarily to ensure that the performances are carried out. These objectives are preceded by the phrase, "students must."

- Students must cancel turn signals after the trailer is around the corner and straightened out.
- Students must adjust speed to configuration and condition of the roadway.

Knowledge Objectives

Knowledge objectives describe the information needed by students to meet performance objectives. Some forms of knowledge play an enabling role while others are intended to motivate. Knowledge objectives include the following:

Procedural Knowledge-The knowledge of steps used to carry out certain performances.

Factual Knowledge-Specific items of factual information needed to carry out procedures, e.g., stopping distance, tire inflation, common hazards.

Conceptual Knowledge-Knowledge of relationships, e.g., the relationship between speed and stopping distance.

Examples of knowledge objectives concerned with shifting gears include the following:

Students must know

- shifting procedures for transmissions to be taught.
- the instruments and controls necessary to shift gears properly.

- the shift patterns of all major conventional transmissions.

- common shifting errors and their consequences.

Skill Objectives

Possession of information is often not enough to ensure that students can master performance objectives. Skills are also required. Skill objectives include the following:

Perceptual Skills-The ability to interpret complex patterns of stimuli, e.g., the ability to judge distance and closure in determining the acceptability of gaps in traffic.

Perceptual Motor Skills-The ability to couple sensory feedback and motor response, often involving two or more simultaneous responses in achieving a smooth overall performance, e.g., coordinating clutch, throttle, and gear shift lever while getting a tractor-trailer underway.

Mental Skills-The ability to reason deductively or inductively, e.g., interpreting and applying Hours of Service Regulations.

The descriptions of skill objectives attempt to identify these specific elements of skill. An example of the skill objective in support of backing is

- Students must be able to coordinate speed and direction control to achieve the desired path while backing.

One characteristic of skills is that they require practice for attainment of the objective. A major purpose in listing skill objectives is to call attention to those performances for which practice must be provided in instruction.

Attitude Objectives

The acquisition of knowledge and skill does not ensure adequate performance. Students must, in addition to having knowledge and skill, possess attitudes favorable toward performance. This is particularly true for those performances where the objective of instruction is that of ensuring performance is carried out.

Much of the information that makes up attitude objectives is concerned primarily with motivating students to perform. However, not all of the information will be believed by all students. Where differences in student beliefs are likely to exist, those beliefs sought by the instruction are specified as attitude objectives. An example of an attitude objective concerned with speed is

- Students must believe that driving proficiency cannot compensate for speed that is excessive for prevailing conditions.

Setting forth attitude objectives does not imply an assumption that students will hold the desired beliefs upon the completion of a unit of instruction. Although knowledge and skill objectives will be attained in time, given the requisite aptitudes, many students will graduate without sharing the beliefs sought by the Curriculum Unit Standards. However, changes in belief are more likely to be realized if they are made explicit objectives of training than if they are excluded from training objectives.

INSTRUCTIONAL METHODS

The Curriculum Unit Standards provide for four different lesson "modes" or categories: classroom, lab, range, and street. There are nine instructional methods that should be used for these modes.

Presentation

Presentation is teaching or presenting information during classroom lessons. Because it is the demanding form of instruction for an instructor, presentation requires the most detailed guidance of all of the methods employed. Therefore, presentation accounts for the overwhelming majority of the guidance provided in the Instructor Manual of the model curriculum.

In the Curriculum Unit Standards, the instructor has primary responsibility for presenting information. Although the use of audio visual presentations such as videotape, slide/cassette, or film is encouraged, the Curriculum Unit Standards do not rely on their use.

Presentation is not equivalent to lecture. Instructors are expected to make the presentation of information as interactive as possible by calling on students to react to what is presented, contribute their own experiences, and discuss the implications of what they are presented with among themselves.

Demonstration

When the students are called on to perform an activity for the first time, they must be given a preliminary demonstration by the instructor. Demonstration is most frequently used in range and lab instruction. The demonstrations should be kept brief so that the maximum time can be made available to the students to practice.

Student Practice

Most of the instruction in the the Curriculum Unit Standards consists of student practice of the performances that serve as the objective of training. The majority of this practice is behind the wheel of the truck, either on the range or on the street. Other major areas of practice include pre-trip inspection, coupling and uncoupling, servicing and maintenance, cargo

handling, maintaining logs, and preparing cargo documentation. All practice takes place under the supervision of an instructor who must provide feedback on correct and incorrect performance.

Range and Street Observation Time

Because practice involves direct interaction with the vehicle, it can accommodate only one student at a time and, since the number of students exceeds the number of available vehicles, not all students can practice at the same time. To insure that learning is taking place, all students shall be required to observe, evaluate, analyze, and critique the performance of the student drivers. The use of checklists to guide and record their activity is required. In addition, instructors shall call frequently upon student observers to point out driver errors and describe the correct course of action. At the end of observation periods, the instructor shall review and critique the student's observation performance. This is the only way that time allocated to observation can be counted as meeting these Unit Standards.

Problem Solving

Much of the classroom activity consists of exercises in which students apply information that they have recently learned to the solution of problems, including traffic problems and cargo handling problems. This activity differs from student practice in that it is basically a conceptual, paper-pencil exercise rather than a hands-on experience.

Group Discussion

The attainment of attitude objectives often depends to a great extent upon peer acceptance of the instruction. Group discussion can help foster peer acceptance. The instructor's role in group discussions is to (1) raise issues to trigger discussion, (2) provide information to help clarify issues and avoid misconceptions, and (3) see that all students have an opportunity to participate.

Role Playing

Certain of the activities required of tractor-trailer drivers involve social interaction, including handling accidents, employment interviews, and dealing with customers. Role playing exercises are provided to give students simulated practice in carrying out the activities. The practice is intended to develop both skill and confidence. The latter is of particular importance in situations where anxiety is likely to be involved, e.g., accidents and employment situations. Allowing students to experience much of the emotion within the protective confines of instruction helps to develop confidence and their ability to succeed.

Field Trips

The Curriculum Unit Standards specify optional field trips to gain familiarity with tractor-trailer rigs not available at the school and the actual operation of cargo handling operations. Because of the travel time involved and their marginal value in helping to obtain instructional objectives, the use of field trips is not mandatory.

Independent Study (Homework)

The training objectives that the Curriculum Unit Standards are designed to fulfill permit hours of classroom instruction to be reduced through homework. They do not, however, specifically call for homework assignments for the following reasons:

- Materials that are suitable and readily available could not be identified.
- Many schools cannot afford to provide suitable material.
- Many students cannot learn effectively through homework.

The fact that the Curriculum Unit Standards do not specifically call for homework should not discourage schools from using it as an instructional method where appropriate materials are available and students are capable of participating in such study.

MINIMUM HOURS OF INSTRUCTION

An outline of the Curriculum Unit Standards by section, unit, and instructional method appears on the following page. The numbers indicate the minimum hours required for each unit, and each instruction method within that unit. Range and street hours refer to BTW instruction. Exceptions to these minimum hours are authorized where

- attainment of instructional objectives for each unit can be demonstrated through objective measures.
- students have already achieved partial fulfillment of objectives through experience prior to entering.
- students are being trained by or for specific employers whose operation makes attainment of certain objectives unnecessary.

As shown in the Curriculum Unit Standards outline, a minimum of 320 hours of direct student participation is necessary to attain the required instructional objectives, subject to student/instructor ratios. Of this total, 86.5 hours are allocated to classroom instruction, 25.25 hours to lab instruction, 92.25 hours to range instruction and 116 hours to street instruction.

CURRICULUM UNIT STANDARDS OUTLINE

	NUMBER OF LESSONS (OPTIONAL)	MINIMUM HOURS REQUIRED				
		CLASSROOM	LAB	RANGE	STREET	TOTAL
SECTION 1 - BASIC OPERATION						
Unit 1.1 - Orientation	3	3.25	1.00	0	0	4.25
Unit 1.2 - Control Systems	2	1.75	.75	0	0	2.50
Unit 1.3 - Vehicle Inspection	2	2.00	4.00	0	0	6.00
Unit 1.4 - Basic Control	4	.75	0	7.25	0	8.00
Unit 1.5 - Shifting	2	1.25	0	3.00	0	4.25
Unit 1.6 - Backing	2	.75	0	22.00	0	22.75
Unit 1.7 - Coupling and Uncoupling	2	.75	0	3.50	0	4.25
Unit 1.8 - Proficiency Development: Basic Control	3	1.50	0	36.00	18.00	55.50
Unit 1.9 - Special Rigs	2	1.00	3.50*	0	0	4.50
TOTALS	22	13.00	9.25	71.75	18.00	112.00
SECTION 2 - SAFE OPERATING PRACTICES						
Unit 2.1 - Visual Search	3	1.25	.75	0	8.00	10.00
Unit 2.2 - Communication	2	1.25	0	0	3.00	4.25
Unit 2.3 - Speed Management	2	2.00	0	1.75	0	3.75
Unit 2.4 - Space Management	2	1.75	0	0	6.00	7.75
Unit 2.5 - Night Operation	3	.75	0	3.00	4.50	8.25
Unit 2.6 - Extreme Driving Conditions	2	3.25	0	4.00	0	7.25
Unit 2.7 - Proficiency Development: Safe Operating Procedures	2	1.00	0	0	70.50	71.50
TOTALS	16	11.25	.75	8.75	92.00	112.75
SECTION 3 - ADVANCED OPERATING PRACTICES						
Unit 3.1 - Hazard Perception	2	1.50	0	0	6.00	7.50
Unit 3.2 - Emergency Maneuvers	2	1.50	0	4.00	0	5.50
Unit 3.3 - Skid Control and Recovery	2	1.25	0	7.75*	0	9.00
TOTALS	6	4.25	0	11.75	6.00	22.00
SECTION 4 - VEHICLE MAINTENANCE						
Unit 4.1 - Vehicle Systems	2	11.25	2.00	0	0	13.25
Unit 4.2 - Preventive Maintenance and Servicing	4	1.25	7.50	0	0	8.75
Unit 4.3 - Diagnosing and Reporting Malfunctions	2	3.00	1.00	0	0	4.00
TOTALS	8	15.50	10.50	0	0	26.00
SECTION 5 - NONVEHICLE ACTIVITIES						
Unit 5.1 - Handling Cargo	4	5.00	4.00*	0	0	9.00
Unit 5.2 - Cargo Documentation	2	4.75	0	0	0	4.75
Unit 5.3 - Hours of Service Requirements	3	5.75	0	0	0	5.75
Unit 5.4 - Accident Procedures	4	13.00*	.75	0	0	13.75
Unit 5.5 - Personal Health and Safety	3	5.00	0	0	0	5.00
Unit 5.6 - Trip Planning	2	4.75	0	0	0	4.75
Unit 5.7 - Public and Employer Relations	2	4.25*	0	0	0	4.25
TOTALS	20	42.50	4.75	0	0	47.25
TOTAL	72	86.50	25.25	92.25	116.00	320.00

29 Units (Mandatory) and 72 Lessons (Optional)

* = Portions of time are optional - refer to text (Time Waivers and Optional Lesson Requirements) for details.

Minimum Driving Requirement

The 116 minimum hours of street instruction is based upon a ratio of three students to one instructor in one vehicle. This time is accumulated through several different units of instruction. With the three to one student/instructor ratio (recommended, but not mandatory, see Student/ Instructor Ratios) each student will receive a minimum of 38.5 hours of actual BTW time. These Standards require each student to receive a minimum of both 38.5 BTW hours and to have driven a cumulative 1,000 miles during this BTW street time.

It is permissible for a school to elect to use other than the three to one student/instructor ratio. If one of the other permissible ratios is chosen, a certain amount of the street observation time may be reduced in unit 2.7 only (see "Time Waivers and Optional Lesson Requirements" for specific details). However, these other ratios are normally neither practical nor cost effective in a typical training school and the minimum graduation requirements of 38.5 hours and 1,000 miles BTW for each student must still be met.

TIME WAIVERS AND OPTIONAL LESSON REQUIREMENTS

The following specifies requirements that must be met and the amount of instructional time that may be waived in certain curriculum units.

Classroom Time

Up to one-half (50 percent) of the minimum classroom instructional hours for units 4.1, 4.3, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 and 5.7 may be waived through the use of suitable quality, independent study materials. To qualify for this waiver, schools shall be required to prove that the independent study materials, when combined with classroom instruction, are capable of enabling students to attain all of the specific unit's objectives. In addition, an examination (which samples from all of the independent study material content) must be administered to such students prior to classroom and/or other subsequent instruction to determine that the independent study objectives have been attained. Students shall not be permitted to participate in subsequent instruction unless and until the independent study objectives have been fully met.

NOTE: Units 5.1, 5.4 and 5.7 each contain optional lessons. A school choosing to take the classroom time waiver on any of these units must then teach the optional lessons or vice-versa. It is thus permissible to select one waiver or the other on these three units but not both.

Street Observation Time

The Curriculum Unit Standards specify 116 hours of street instruction while using a student/instructor ratio of three to one. A total of 70.5 of these 116 hours is contained in unit 2.7 - "Proficiency Development: Safe Operating Procedures." With a three to one ratio each student would receive 23.5 hours of BTW time and 47 hours of street observation time.

When a school is using either a one to one or a two to one student/instructor ratio, the street observation times may be reduced as follows:

- With a one to one ratio, the 70.5 hours may be reduced to 46.5 hours, provided the student receives 23.5 hours BTW time and 24 hours street observation time.

- With a two to one ratio, the 70.5 hours may be reduced to 47 hours, provided each student receives 23.5 hours BTW time and 23.5 hours of street observation time.

Demonstration Time

All student BTW activity first must be demonstrated by an instructor. One brief demonstration of each type of activity may be performed within the hours allocated to BTW time in both range and street instruction.

Unit 1.9 - Option

The lab instruction portion of this unit ("Observation of Special Rigs") has 3.5 hours allocated for a field trip. Since field trips are not mandatory in these Standards, it is an optional lesson. Schools may find it more economical to combine this with the optional field trip concerning cargo operations in unit 5.1.

Unit 3.3 - Option

The range instruction portion of this unit ("Skid Control and Recovery") has 7.75 hours allocated for skid pan training which has been made an optional lesson because of the expense involved in constructing and maintaining a skid pan. Although it is an option, all schools are urged to make every effort possible to provide this important training to its students. Schools which do provide the 2.5 hours of BTW skid pan training for each student (meeting the requirements of this Standard) may reduce the BTW time requirements in unit 2.7 - "Proficiency Development: Safe Operating Procedures" by as much as 4 hours per student.

Unit 5.1 - Option

The lab instruction portion of this unit ("Observation of Cargo Handling Operation") has 2 hours allocated for a field trip. Since field trips are not mandatory in these Standards, it is an optional lesson. Schools may find it more economical to combine it with the optional field trip concerning observation of special rigs in unit 1.9.

Unit 5.4 - Option

Lesson 2 of this unit covers first-aid training. This is strictly an optional lesson; however, for the benefit of the students and to save lives on

the highways, it is recommended that schools provide first-aid training. Th 10 hour multi-media program of the American Red Cross entitled "Essential First-Aid and CPR" (available from all local chapters of the American Red Cross) is considered the best choice. The advantage of this course is that school instructors can be freed to teach other subjects and students who complete the course gain certification in both first-aid and CPR (cardiopulmonary resuscitation). A second option is for schools to provide 2.5 hours classroom instruction in emergency first-aid, to be taught by a certified first-aid practitioner. Schools that elect to teach the American Red Cross 10-hour course have the option of reducing classroom time in Unit 5.5 (Personal Health and Safety) by up to 1.5 hours and in Unit 5.7 (Public amd Employer Relations) by up to 1 hour, without the need to meet the classroom instruction time waiver requirements as specified under Classroom Time in th section.

Unit 5.7 - Option

One of the classroom instruction requirements in this unit ("Public and Employer Relations") covers a guest lecture of 45 minutes by a local truckin industry representative. This is optional but should be used where possible as a benefit to student job seekers.

Curriculum Unit
Standards

CURRICULUM UNIT STANDARDS

OVERVIEW

There are 29 individual Curriculum Unit Standards which are grouped into 5 sections as follows:

Section 1 - Basic Operation
Section 2 - Safe Operating Practices
Section 3 - Advanced Operating Practices
Section 4 - Vehicle Maintenance
Section 5 - Non-Vehicle Activities

Each of the Curriculum Unit Standards specifies minimum requirements for the following items on an individual unit basis:

- o Purpose of the Unit
- o Hours of Instruction
- o Instructional Objectives
  - -Performance
  - -Knowledge
  - -Skill
  - -Attitude
- o Instructional Methods
  - -Classroom
  - -Lab
  - -Range
  - -Street
- o Support Requirements
  - -Materials
  - -Equipment

Requirements for such things as instructor qualifications, training facilities, motor vehicle requirements and graduation requirements may be found in other sections of these Standards.

For further clarification, by way of example, the reader should consult the individual lesson plans found within the units of instruction in the Bureau of Motor Carrier Safety's "Model Curriculum For Training Tractor-Trailer Drivers" which is based upon these Curriculum Unit Standards.

SECTION 1 - BASIC OPERATION

The units in this section cover the interaction between students and the vehicle. They are intended to teach students to control the motion of the vehicle, ensure it is in proper operating condition, and couple it to trailers. Nine units comprise this section:

Unit 1.1 - Orientation

Unit 1.2 - Control Systems

Unit 1.3 - Vehicle Inspection

Unit 1.4 - Basic Control

Unit 1.5 - Shifting

Unit 1.6 - Backing

Unit 1.7 - Coupling and Uncoupling

Unit 1.8 - Proficiency Development: Basic Control

Unit 1.9 - Special Rigs

Notes:

UNIT 1.1 ORIENTATION

PURPOSE

Classroom instruction on course content and vehicle components. Instructor points out key components of tractor-trailer in demonstration.

HOURS IN INSTRUCTION

Each school must devote a minimum 4.25 hours of orientation to tractor-trailer driving and curriculum.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

There is no terminal objective in this unit. The focus of the unit is to introduce tractor-trailer driving, the curriculum, and the student's responsibilities.

Knowledge Objectives

Students must know

- o major components of a tractor-trailer.
- o general operation of the trucking industry.
- o course objectives.
- o rules of student conduct during instruction.
- o safety rules to be observed during range and street instruction.
- o methods of evaluating student performance and standards to be met.
- o minimum requirements for graduation.

Skill Objectives

None.

Attitude Objectives

Students must believe that

- o school safety regulations are for their protection.
- o all school regulations must be obeyed.

INSTRUCTIONAL METHODS

Classroom

A total of 3.25 hours of instruction must be spent in the classroom. The instructor must use 2 hours for presentation of information on course requirements, including range and street safety rules. One hour is allocated to describing/showing the key parts of a tractor-trailer.

Lab

One hour must be allocated to instructor demonstration of main components of the tractor-trailer.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom and lab instruction must be supported by

- materials descriptive of course requirements, including objectives, schedules, rules and regulations.

- materials needed to prepare for instruction, including Glossary and List of Abbreviations, local permits and licenses, labor forms, and financial assistance forms.

Equipment

None.

Notes:

UNIT 1.2 CONTROL SYSTEMS

PURPOSE

Students introduced to function, operation and meaning of instruments and controls, e.g., gear shift, tachometer, etc.
Instructor points out controls, instruments and their operation during demonstration.

HOURS OF INSTRUCTION

Each school must devote a minimum 2.5 hours to instruction in vehicle controls and vehicle system monitoring devices.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to identify each of the vehicular driving controls and monitoring devices (gauges, alarms, lights, etc.) required to operate the vehicle safely and efficiently.

Knowledge Objectives

Students must know

- the name, location, and function of each of the primary controls, including those required for steering, accelerating, shifting, braking, and parking.
- the name, location, and function of each of the secondary controls, including those required for control of lights, signals, windshield wipers and washers, interior climate, engine starting and shutdown, suspension, and coupling.
- the name, location, function, and the acceptable reading range of the various instruments required to monitor vehicle and engine speed as well as status of fuel, oil, air, cooling, exhaust, and electrical systems.

Skill Objectives

None.

Attitude Objectives

Students must believe

- o monitoring the instrument panel for early warning of malfunctions is a basic requirement for safe and efficient operation.
- o instruments can and will malfunction and that the displayed information can and must be augmented by information from other sources.

INSTRUCTIONAL METHODS

Classroom

A total of 1.75 hours must be spent in classroom instruction or home study on gauges and controls, including illustrations capable of achieving knowledge and attitude objectives.

Lab

At least .75 hour of instruction specifically related to gauges and controls must take place in the cab and include demonstration and explanation of various conditions indicated by gauges.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

The classroom instruction must be supported by visual aids, (e.g., transparencies, mockups) depicting location, appearance, and proper readings of gauges and controls.

Equipment

None.

UNIT 1.3 VEHICLE INSPECTIONS

PURPOSE

Students learn the importance of systematic vehicle inspections and develop the skills necessary for good inspection.
Students will learn pre-trip inspection procedures used throughout this course.

HOURS OF INSTRUCTION

Each school must devote a minimum 6.0 hours of instruction in systematic vehicle inspection, exclusive of inspections regularly performed prior to on-street driving sessions.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- inspect and determine the condition of critical vehicle components, including instruments and controls; engine and drive train; chassis and suspension; steering system; braking system; tires, wheels, and rims; lighting and signaling system; coupling system; emergency equipment; and cargo securement device(s).
- perform pre-trip inspections in a regular, systematic sequence that is accurate, uniform and time efficient.
- perform enroute inspections by checking mirrors for signs of trouble; monitoring instruments and looking, listening and feeling for indications of malfunctions; making periodic roadside inspections of critical components; and meeting enroute requirements for transporting dangerous cargo.
- perform post-trip inspections by making accurate notes of actual and suspected component abnormalities or malfunctions.

Students must not operate a vehicle found to be in unsafe (for vehicle, driver, and other road users) operating condition, either prior to a trip or enroute.

Knowledge Objectives

Students must know

- a systematic procedure to assure a rapid and complete inspection.
- the effect of undiscovered malfunctions upon safety, effectiveness, and economy.
- the importance of correcting malfunctions quickly.
- Federal, State, and other regulations governing inspection, including special regulations for hazardous cargo.
- procedures for post-trip inspection.

Skill Objectives

None.

Attitude Objectives

Students must believe

- the consequences of breakdowns and accidents justify time spent on inspections.
- it is the driver's obligation to the employer and other road users to ensure that the vehicle is in safe operating condition before taking it out on the road and to cease operating it if an unsafe condition has been discovered.

INSTRUCTIONAL METHODS

Classroom

A total of 2.0 hours shall be spent in the classroom on instruction in inspection procedures, including failure recognition, use of checklists, demonstration of inspection procedures, consequences of faulty inspection, and discussion of importance of consistent and thorough inspection.

Lab

A minimum of 4.0 hours must be allocated to instruction on the actual vehicle, including instructor demonstration, student practice, student observation, and evaluation of student performance.

Range

None.

Street

In addition to the 6.0 hours of classroom and lab instruction, schools must allocate a collective total of one hour or more to student-conducted pre-trip inspections prior to regular on-street training sessions.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by visual aids that demonstrate characteristics of vehicle malfunctions, their appearance, detection, and adverse consequences. Schools must supply checklists for student use.

Equipment

None.

UNIT 1.4 BASIC CONTROL

PURPOSE

Students introduced to basic vehicle operation and concepts in class. Instructor demonstrates starting, stopping, backing with students. Students gain initial practice in basic control on range.

HOURS OF INSTRUCTION

Each school must devote a minimum 8.0 hours to instruction in basic control of the vehicle.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- o check the trailer coupling.
- o start, warm up, and shut down the engine, according to the manufacturer's specifications.
- o put the vehicle in motion and accelerate smoothly, forward and backward, with the instructor's assistance.
- o bring the vehicle to a smooth stop.
- o back the vehicle in a straight line.
- o position the vehicle for a turn and negotiate turns of different degrees and radii.

Knowledge Objectives

Students must know

- o the procedures for carrying out the performance objectives.
- o the consequences of excessive idling.
- o the relationship of wheel base length, articulation, and number of axles to path of a turn.

- o the proper position from which to begin a turn and how to "set up," execute and recover from a turn.
- o manufacturer's specifications for engine operation.

Skill Objectives

Students must

- o coordinate use of accelerator and clutch to achieve smooth acceleration and avoid clutch abuse.
- o properly modulate air brakes to bring vehicle to a smooth stop.
- o coordinate steering, braking, and acceleration to take the vehicle through a desired path forward and to back in a straight line.
- o adequately judge the path trailer will take (off-tracking) as vehicle negotiates left or right curves and turns.

Attitude Objectives

Students must believe that following correct starting, warm-up, and braking procedures is essential to safe and economical vehicle operation.

INSTRUCTIONAL METHODS

Classroom

A total of .75 hour of instruction may take place in the classroom, including description of procedures and demonstration of turning dynamics.

Lab

None.

Range

A total of 7.25 hours must be allocated to range instruction, during which each student must spend a minimum of 2.25 hours in BTW practice. Each practice session must be preceded by sufficient instructor demonstration to ensure that students understand the procedures to be practiced. In addition, student practice must be continually observed

and evaluated by the instructor to ensure that appropriate progress is being made and to eliminate any developing bad habits.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by visual aids (e.g., transparencies, films, and models) capable of illustrating turning characteristics of tractor-trailers.

Equipment

All necessary equipment to support range instruction such as barricades, traffic cones and curbing (see Training Equipment and Materials Standards).

UNIT 1.5 SHIFTING

PURPOSE

Students introduced to basic gear shifting procedures and shift patterns for most common tractor transmissions.
Instructor demonstrates shifting on range.
Students practice shifting up through the first three gears.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.25 hours to instruction in shifting.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- o shift up and down through all gears of all major types of conventional transmissions, including auxiliary transmissions and multispeed axles.*
- o double clutch and time shift for smooth and fuel-efficient performance.
- o select proper gear for speed and highway conditions.
- o operate with fully automatic and semiautomatic transmissions.

Knowledge Objectives

Students must know

- o shifting procedures for transmissions.
- o the instruments and controls necessary to shift gears properly.

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* Students being trained by or for a specific employer need operate only those transmissions used by the employer.

- the shift patterns of all major types of conventional transmissions.
- common shifting errors and their consequences.

Skill Objectives

Students must coordinate use of hands, feet, sight, and hearing in shifting, including double clutching, to achieve maximum performance consistent with economy, safety, and smoothness of operation.

Attitude Objectives

Students must believe

- improper use of clutch and transmission will cause severe damage to the vehicle.
- using proper shifting techniques will improve fuel mileage, reduce operating costs, and benefit the company and the driver.

INSTRUCTIONAL METHODS

Classroom

A total of 1.25 hours will be spent in classroom instruction, including descriptions and demonstrations of shifting procedures, shift patterns, and consequences of shifting errors.

Lab

None.

Range

A total of 3.0 hours of range instruction is required, during which each student must have a minimum of .75 hour of BTW practice in upshifting and downshifting, either on the range or in a protected street area. This time may be reduced to a half-hour if accompanied by .75 hour of practice in a shifting simulator.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials and visual aids that describe and illustrate shift patterns and procedures.

Equipment

Simulation equipment, if employed, must simulate the shifting task with sufficient fidelity to permit transfer to operation of actual transmissions.

UNIT 1.6 BACKING

PURPOSE

Students introduced in classroom to methods and concepts of backing a tractor-trailer.
Instructor demonstrates and students practice variety of backing exercises on range.

HOURS OF INSTRUCTION

Each school must devote a minimum 22.75 hours to instruction in backing techniques.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- back in straight line and curved path.
- back into an alley dock.
- parallel park.
- park in a jackknife position.
- judge side, rear, and overhead clearances and path of the trailer.

Students must

- get out of vehicle and check to the rear before backing.
- warn others that truck is backing.
- use mirrors to check path and clearances while backing; on long distances, stop, get out and recheck path.

Knowledge Objectives

Students must know

- the procedures for backing alley dock, parallel and jackknife parking.
- the correct position in which to place the vehicle before beginning backing maneuvers.
- the principles of reverse-steering an articulated vehicle.
- the hazards of backing, the importance of avoiding unnecessary backing and blind-side backing, and the importance of checking the area prior to backing and of using a guide for assistance.

Skill Objectives

Students must be able to coordinate speed and direction controls to achieve the desired path while backing.

Attitude Objectives

Students must believe

- all backing is potentially hazardous.
- the best way to avoid backing accidents is by avoiding the need to back.
- all backing accidents can be avoided.

INSTRUCTIONAL METHODS

Classroom

A total of .75 hour of instruction is required, to include descriptions of backing and parking procedures and demonstrations of trailer tracking in reverse.

Lab

None.

Range

A total of 22.0 hours is allocated for range practice, during which each student must have a minimum of 7.0 hours of BTW practice in backing and parking on the range.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by visual materials (e.g., films, models) that describe backing and parking procedures and demonstrate backing procedures and the path of the trailer in reverse.

Equipment

Equipment must include range aids to permit parking and docking exercises, e.g., stanchions, parked trailers, barricades.

UNIT 1.7 COUPLING AND UNCOUPLING

PURPOSE

Students introduced to procedures for safely coupling and uncoupling a tractor-trailer.
Instructor demonstrates coupling/uncoupling procedure and students begin practice under supervision.
Students develop proficiency throughout course by performing activity before and after street lessons.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.25 hours to instruction in coupling and uncoupling, exclusive of coupling and uncoupling performed in connection with on-street driving sessions.

INSTRUCTIONAL OBJECTIVES

Performance Objectives: Coupling

Students must be able to

- o align the tractor properly to connect with trailer.
- o secure the trailer against movement.
- o back the tractor properly into the trailer kingpin without damage.

Students must

- o perform mechanical and visual checks to make sure coupling is secure.
- o connect electrical and air lines properly.
- o set in-cab air brake controls properly.
- o retract and secure landing gear after coupling is secure.

Performance Objectives: Uncoupling

Students must be able to

- o select a surface capable of supporting the trailer and secure the vehicle against movement.
- o set in-cab airbrake controls properly.
- o lower landing gear sufficiently to raise trailer to the proper height.
- o disconnect air and electrical lines prior to uncoupling.
- o check to make sure landing gear is supporting trailer as tractor is withdrawn.

Knowledge Objectives

Student must know

- o the procedures for proper coupling and uncoupling.
- o the hazards of improper coupling and uncoupling.

Skill Objectives

Students must

- o align the two units, tractor and trailer.
- o back the trailer to achieve sufficient force to lock the fifth wheel and the kingpin without damaging the kingpin.
- o pull against the pin to check the connection without abusing the tractor.

Attitude Objectives

Students must believe

- o careless coupling and uncoupling is very dangerous.
- o the accidents caused by improper coupling and uncoupling are always preventable.

INSTRUCTIONAL METHODS

Classroom

A total of .75 hour is required, including descriptions and demonstrations of coupling and uncoupling procedures and the consequences of improper coupling and uncoupling.

Lab

None.

Range

A minimum of 3.5 hours must be allocated to instruction on the vehicle, including instructor demonstration, student practice, student observation and evaluation of student performance. Each student must have a minimum of 1.0 hour of BTW in coupling and uncoupling practice.

Street

In addition to the 4.25 hours of classroom and range instruction, students must practice coupling and uncoupling as part of street instruction in section 2. Each student must, at a minimum, couple and uncouple three times each type of trailer to be used during street instruction.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by visual aids (e.g., films, models) that demonstrate coupling and uncoupling and illustrate the consequences of improper procedures.

Equipment

None.

UNIT 1.8 PROFICIENCY DEVELOPMENT: BASIC CONTROL

PURPOSE

To practice skills learned in units 1.2 through 1.6.
A series of basic exercises are practiced on the range until students develop sufficient proficiency to drive on street.
Initial on-street practice occurs after sufficient proficiency is developed on range.

HOURS OF INSTRUCTION

Each school must devote a minimum 55.5 hours (see "Minimum Hours of Instruction") to the development of the students' proficiency in basic vehicle control. Since students vary in their learning rate, the 55.5 hours may be treated as an average for all students. The required time may be reduced for individual students who meet documented standards, provided the time saved is given to students failing to meet the standard within allocated hours.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to perform the following to the level of proficiency required to permit safe entry into on-street instruction:

- Maneuvering through sharp turns (e.g., offset or alley) in both directions.
- Maneuvering through a series of sharp turns (e.g., serpentine) in both directions.
- Maneuvering into areas restricted to the rear, sides, and front (e.g., alley dock) in both a straight-line and jackknife (both sides) position.
- Parallel parking.
- Judging the position of the right wheel.
- Judging clearances at the rear, front sides, and overhead.
- Maintaining proper vehicle and engine speed on upgrades and downgrades.

Knowledge Objectives

No new objectives.

Skill Objectives

The students must

- o coordinate acceleration and braking to maneuver the vehicle with a high level of proficiency.
- o coordinate clutch, throttle and gear shift to maintain engine at proper speed when shifting on upgrades and downgrades.

Attitude Objectives

No new objectives.

INSTRUCTIONAL METHODS

Classroom

A total of 1.5 hours is required for classroom instruction describing the maneuvers to be performed and the standards to be attained.

Lab

None.

Range

A total of 36.0 hours must be allocated to range instruction and practice and a minimum of 10.0 hours must be devoted to BTW student practice in performing maneuvers leading to attainment of instructional objectives. The additional time saved (2.0 hours) must be allocated to slower students.

Street

A total of 18.0 hours must be allocated to on-street instruction once the prerequisites for street operation have been met by each student. A minimum of 3.0 hours must be allocated to BTW student practice in a low density traffic environment, followed by another 3.0 hours of BTW student practice in moderate density traffic.

SUPPORT REQUIREMENTS

Materials

Instruction must be supported by instructor and student materials describing and illustrating each of the maneuvers to be performed and standards to be attained, and by forms to permit instructors and students to record student performance against specified standards.

Equipment

Maneuvering restrictions on the range must be set up with the use of range aids, e.g., traffic cones, stanchions, and barricades.

UNIT 1.9 SPECIAL RIGS

PURPOSE

Classroom instruction on handling and operational characteristics of vehicles on which students are not trained, e.g., tankers, refrigerated vehicles.
Field trip taken to observe special rigs and special rigs observed during all on-street practice.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.5 hours* of instruction to the requirements of special rigs (any vehicle other than the 18-wheel rig with a 40-45 foot trailer upon which this curriculum is predicated), including vehicles that involve (1) unconventional articulation, (2) instability (swinging or sloshing load) or high center of gravity, (3) reduced clearance to the sides, bottom, and/or top, (4) reduced rate of acceleration/deceleration, or (5) any characteristic that creates a high accident risk.

In addition to this introductory instruction, each student, before permitted to operate a special rig, must receive training sufficient to attain all objectives of units 1.2 through 1.8 for that vehicle.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- o recognize the most frequently encountered special rigs.
- o determine whether they can safely operate any type of special rig.

Knowledge Objectives

Students must know

- o the function, operating characteristics, physical dimensions, special features, and hazards of special rigs.

* 3.5 hours under lab instruction is optional.

- the hazards of attempting to operate a special rig when the driver is not qualified.

Skill Objectives

No new objectives.

Attitude Objectives

Students must believe

- special rigs require special qualifications and training.

INSTRUCTIONAL METHODS

Classroom

At least 1 hour of instruction must take place in the classroom and include presentation of information on characteristics of special rigs and practice in identification.

Lab

An optional 3.5 hours of lab instruction may take place at facilities where a variety of special rigs can be observed and their characteristics demonstrated, e.g., dealer, carriers.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by handouts, transparencies, slides, and films illustrating the physical appearance and operating characteristics of special rigs.

Equipment

No special equipment is required. Students may be exposed to actual vehicles at the school, or by visiting motor carriers, truck stops, or truck equipment dealers.

SECTION 2 - SAFE OPERATING PRACTICES

The units in this section cover the interaction between the vehicle and the highway traffic environment. They are intended to teach students to apply their basic operating skills in a way that ensures their own safety and that of other road users. Seven units comprise this section:

Unit 2.1 - Visual Search

Unit 2.2 - Communication

Unit 2.3 - Speed Management

Unit 2.4 - Space Management

Unit 2.5 - Night Operation

Unit 2.6 - Extreme Driving Conditions

Unit 2.7 - Proficiency Development: Safe Operating Procedures

UNIT 2.1 VISUAL SEARCH

PURPOSE

Classroom instruction on the principles of visual search.
Range instruction on the use of mirrors.
On-street practice in use of visual search techniques.

HOURS OF INSTRUCTION

Each school must devote a minimum 10.0 hours to instruction in visual search activities.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- maintain a minimum 12-second eye lead time.
- scan both sides of the road using quick glances to observe roadside activity and the behavior of adjacent vehicles.
- maintain a visual pattern that involves frequent checking of all mirrors for hazards, particularly before changing speed and direction.
- frequently check instrument panel.
- look ahead as far as possible during turns and on curves.
- monitor overtaking traffic to be aware of vehicles in the rear and side blind spots.
- avoid diverting attention from path ahead longer than a second at a time.

Knowledge Objectives

Students must know

- the proper adjustments of the various types of mirrors.

- the differences in images presented by flat and convex mirrors.
- the importance of making all visual checks to the sides and rear of the vehicle and quick visual checks of the mirrors to limit the amount of time a driver's eyes are off the road ahead.
- the relationship between speed and sight distance.
- search patterns appropriate for straight driving, changing speed or direction, and entering or crossing traffic.

Skill Objectives

Students must be able to

- read and interpret the images presented by flat and convex mirrors.
- maintain a straight-line path while taking eyes off the road ahead.

Attitude Objectives

Students must believe

- the ability to respond to changing road conditions requires proper visual scanning.
- mirrors will not reveal every hazard.
- development of good visual search habits is essential to safe driving and will reduce driver fatigue.

INSTRUCTIONAL METHODS

Classroom

A total of 1.25 hours instruction is required in the classroom and must include descriptions of appropriate search patterns, demonstration of search patterns and field of view, description of the danger of failing to employ proper search procedures, and demonstration and description of commentary driving techniques.

Lab

A total of .75 hour must be spent on the range in instruction in

proper use of rear-view mirrors, including adjustment, demonstration of field of view, and interpretation of convex mirrors.

Range

None.

Street

A total of 8.0 hours must be allocated for street instruction and practice specifically for proper search patterns, e.g., commentary driving. Each student must receive a minimum 2.5 hours BTW in practice of visual search, 1.25 hours in low density traffic, followed by 1.25 hours in moderate density traffic.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials, including visuals, that describe search procedures, demonstrate proper search patterns, and illustrate the hazards that accompany the failure to search properly. Glossaries of terms used in commentary driving should be provided. Observer checklists or a videotape recorder should be provided for use in in-cab instruction.

Equipment

Tractor should be equipped with "west coast" type mirrors and convex mirrors (both right and left sides). An additional convex mirror on the left side should be mounted to allow student to see upper front of trailer.

UNIT 2.2 COMMUNICATION

PURPOSE

Classroom instruction on communication, e.g., signaling, use of horn, etc. On-street practice in communication techniques in different settings.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.25 hours to instruction in how to communicate their presence and intentions to other road users.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- o signal intention to change position before pulling onto or off of the road or changing lanes.
- o cancel turn signals after trailer is around the corner and straightened out.
- o time signals so that they are not confusing to other drivers.
- o flash brake lights to warn following drivers that the tractor-trailer is slowing or stopping.
- o use four-way flashers according to State laws and company policies.
- o use headlights in daytime under conditions of low visibility.
- o position vehicle where it can be seen by other drivers.
- o make selective use of horn and lights to prevent collisions.
- o limit use of CB radio to communications that will enhance safety and traffic flow, especially when engaged in other maneuvers.
- o establish eye contact with drivers or pedestrians that may enter their intended path of travel.

- o avoid entering the path of other vehicles on the basis of a signal.

Knowledge Objectives

Students must know

- o when to actuate turn signals to provide adequate warning without creating confusion.
- o State traffic laws concerning use of turn signals.
- o importance of signaling to the prevention of accidents.
- o importance of not giving signals that lead to the assumption of liability (e.g., inviting others to pass).
- o importance of using horn solely to give warning and not using it for other purposes (e.g., intimidation).
- o conditions under which other drivers may give false signals.

Skill Objectives

None.

Attitude Objectives

Students must believe

- o signaling one's intention is essential to avoiding collisions and traffic violation convictions.
- o signaling at all times is necessary to develop proper habits.
- o improper use of horn is dangerous and can cause problems with public relations.
- o improper use of the CB is potentially dangerous, possibly illegal, and creates poor industry image.

INSTRUCTIONAL METHODS

Classroom

A total of 1.25 hours shall be allocated to classroom instruction and must include presentation of information on communication procedures, the hazards of improper communications, and exercises in communication problems.

Lab

None.

Range

None.

Street

A total of 3.0 hours of street instruction is required, during which each student must spend at least 1.0 hour BTW on instruction and practice specifically devoted to proper communication. This should include evaluation of student performance by instructors and exercises such as having students comment on the signaling habits of other road users.

SUPPORT REQUIREMENTS

Materials

Classroom materials must include visuals that illustrate proper communication procedures and the consequences of improper communication and that provide situations for classroom exercises. In-vehicle materials should include instructor checklists to rate student performance.

Equipment

None.

UNIT 2.3 SPEED MANAGEMENT

PURPOSE

Classroom instruction on speed management principles, e.g., maintaining safe speed in different situations, operating on hills, curves, etc. Speed management demonstration on range.

HOURS OF INSTRUCTION

Each school must devote a minimum 3.75 hours to instruction in speed management.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- adjust speed to the configuration and condition of the roadway; weather and visibility conditions; traffic conditions; and vehicle, cargo and driver conditions.
- obey the legal speed limit.

Knowledge Objectives

Students must know

- the relationship of speed to stopping distance, hydroplaning, crash severity, ability to maneuver, and fuel economy.
- the effect on maximum safe speed of vehicle weight, center of gravity, loss of stability, available sight distance, and road surface conditions.

Skill Objectives

Students must judge maximum safe speed

- at which a curve can be entered.

- which traction will permit.
- at which vehicle control can be maintained under crosswinds, limited visibility, and limited traction.

Attitude Objectives

Students must believe

- driving proficiency cannot compensate for speed that is excessive in prevailing conditions.
- speed may be too fast for conditions.
- adhering to the national maximum speed limit--55 mph--is beneficial to the nation and cost-beneficial to the driver, the employer, and the trucking industry.
- an excessive number of speeding violations may result in loss of employment.

INSTRUCTIONAL METHODS

Classroom

A minimum of 2.0 hours of instruction must take place in the classroom, and include information on all of the factors that affect safe speed. Demonstrations of the effects of speed upon stopping distance, maneuverability, ability to corner, and fuel consumption must be presented also.

Lab

None.

Range

A total of 1.75 hours of instruction is allocated to demonstration and practice of the adverse effects of speed upon stopping distance and the ability to maneuver.

Street

Although there is no street session specifically devoted to speed management, the instructor will monitor students' speed throughout all street sessions and will correct students when they are driving too fast for conditions.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials presenting information on speed and accidents (e.g., statistics), including visuals that illustrate the effects of various factors on maximum safe speed.

Equipment

Range instruction must be supported by all equipment necessary for instructor demonstration, e.g., brake detonator devices or similar devices.

UNIT 2.4 SPACE MANAGEMENT

PURPOSE

Classroom instruction on principles of managing space in traffic, e.g., following distances, space to the sides and rear, passing, etc.
On-street driving practice in space management techniques.

HOURS OF INSTRUCTION

Each school must devote a minimum 7.75 hours to instruction in space management.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- select a lane offering best mobility and least traffic interruption, in accordance with the law, to cause minimum interference to following vehicles.
- assure a safe gap before changing lanes, passing other vehicles, and crossing or entering traffic.
- position vehicle correctly within lane and relative to crosswalks to minimize hazards to other road users.
- position the tractor and trailer appropriately in initiating and completing a turn to prevent other vehicles from passing on the wrong side and to minimize encroachment on other lanes.
- maintain a following distance appropriate to traffic, road surface, visibility, and vehicle weight.
- maximize separation from traffic when vehicle is disabled.
- avoid structures having inadequate overhead clearance.

Knowledge Objectives

Students must know

- State regulations concerning commercial vehicle following distances, lane use, changing lanes, and passing other vehicles.
- the appropriate following distance for various conditions.
- the importance of maintaining maximum separation from other vehicles to ensure room to maneuver in response to errors of other drivers.
- the importance of checking position of one's own vehicle and other road users by use of mirrors.
- dangers created by overhead obstructions.

Skill Objectives

Students must judge adequacy of gaps for passing, crossing and entering traffic, and changing lanes.

Attitude Objectives

Students must believe

- maintaining maximum separation from other vehicles increases the opportunity to respond safely to driver errors.
- proper position of the vehicle is important to collision prevention.
- it is the driver's responsibility to position the vehicle in such a way as not to impede other road users.
- intimidating other road users by allowing inadequate space is illegal, unsafe, and detrimental to public relations.

INSTRUCTIONAL METHODS

Classroom

A total of 1.75 hours is required for classroom instruction and must include information on procedures for proper positioning and information on and demonstrations of hazards of improper following distances.

Lab

None.

Range

None.

Street

A total of 6.0 hours is required, during which each student must spend a minimum of 1.75 hours BTW on the street practicing handling situations that meet the performance objectives and practicing maneuvers designed specifically to attain skills.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials that describe procedures for proper positioning and the hazards involved in improper positioning, including visuals to illustrate the hazards. Street instruction and observation should be supported by instructor checklists.

Equipment

A stopwatch.

UNIT 2.5 NIGHT OPERATION

PURPOSE

Classroom instruction on inspection, preparation for, hazards of, and actual operations at night.
Range practice inspecting vehicle at night.
On-street lessons requiring application of night driving principles.

HOURS OF INSTRUCTION

Each school must devote a minimum 8.25 hours to instruction in night operation.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- o adjust speed, following distance, and gap selection to nighttime conditions.
- o use high beams wherever legally permitted.
- o dim headlights, in accordance with State laws, to minimize interference with visibility of other drivers.
- o respond safely to the glare of other vehicles by averting eyes and not retaliating.
- o use any auxiliary lighting properly.

Knowledge Objectives

Students must know

- o the procedures for carrying out the performance objectives.
- o the effect of level of illumination on ability to see.
- o the value of high beams to nighttime visibility.
- o State laws covering use of headlights and auxiliary lights.

- the symptoms and danger of fatigue.
- the effect of headlight glare on visibility of others and its implications for the safety of both drivers.
- the general factors affecting night vision, including interior illumination and use of sunglasses during daytime.

Skill Objectives

Students must judge speed, distances, and separation under nighttime conditions.

Attitude Objectives

Students must believe

- the ability to see clearly diminishes at night.
- no one is immune to the effects of fatigue.

INSTRUCTIONAL METHODS

Classroom

A total of .75 hour is required in the classroom and must include changes in driving procedures, and illustration and discussion of the consequences of improper night driving procedures.

Lab

None.

Range

A total of 3.0 hours must be devoted to instruction on the range or a protected street, including student practice of basic vehicle maneuvers in darkness before on-street instruction. Each student must receive a minimum of .75 hour BTW on the range practice.

Street

A total of 4.5 hours is required, during which each student must spend a minimum of 1.5 hours BTW on the street in practicing the use of headlights, maintaining proper speed, following distance, and gap

selection. On-street practice must take place in areas where there is no artificial lighting and urban areas where there is street illumination and light from signs, buildings, and homes.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials to present information on night driving procedures and hazards, including projected visuals demonstrating the effects of darkness and the consequences of improper night driving procedures. Instruction must be supported by checklists.

Equipment

Flashlights for each instructor and penlights for each student.

UNIT 2.6 EXTREME DRIVING CONDITIONS

PURPOSE

Classroom instruction on driving in cold and hot weather, stormy conditions, mountain and desert driving.
Demonstration of putting on chains and towing a stuck vehicle.

HOURS OF INSTRUCTION

Each school must devote a minimum 7.25 hours of instruction in adverse weather, mountain, and desert driving.

INSTRUCTIONAL OBJECTIVES

Performance Objectives: Adverse Weather

Students must

- o prepare for operation in cold weather, including proper use of the front brake limiting valve; removing snow and ice from windows, mirrors, brakes, lights, hand and toe holds, etc.; and installing tire chains when necessary.
- o inspect for cold weather operation by paying special attention to coolant level and mixture, heater, defrosters, wipers, washers, tire tread, brakes, lights, reflectors, wiring system, hoses, fuel, exhaust system, and fifth wheel.
- o provide adverse weather equipment, including chains, scraper, shovel, and warm clothing.
- o make sure that moisture is expelled from the air tanks after each trip.
- o obtain weather information before and during trips and adjust trip plan accordingly.
- o check for ice accumulation on brakes, slack adjuster, air hoses, electrical wiring and radiator shutters during operations.
- o adjust operation of vehicle to weather conditions, including speed selection, braking, direction changes and following distance, to maintain control and avoid jackknifing.

- o assure safe operation of brakes after driving through deep water.
- o use windshield wipers, washers, and defrosters to maintain visibility.
- o observe road surface for changes in conditions.

Students must be able to

- o start engine in cold weather.
- o mount and dismount tire chains.
- o extricate the vehicle from snow, sand, and mud by maneuvering or towing.

Knowledge Objectives: Adverse Weather

Students must know

- o the conditions that produce low traction, including initial rainfall, ice, snow and mud.
- o the effects of rain, snow, and ice upon the ability to maneuver and stop the vehicle.
- o causes and procedures for avoiding skidding and jackknifing.
- o the nature of hydroplaning and the road and vehicle conditions that produce it.
- o the effect of ice, snow, water, mud, and debris on operation of the brakes.
- o the need to make sure all wheels are free to turn.

Skill Objectives: Adverse Weather

Students must be able to

- o adjust rate of change in speed and direction to road conditions to avoid skidding.
- o coordinate acceleration and shifting to overcome the resistance of snow, sand, and mud.

Attitude Objectives: Adverse Weather

Student must believe

- adverse weather conditions require special driving techniques.
- bad weather accidents and jackknifing can be prevented by proper driving techniques.
- it is necessary to carry special equipment and personal gear for safety during adverse weather operation.
- it is dangerous for the driver to leave the vehicle in the event of a breakdown during adverse weather conditions.

Performance Objectives: Hot Weather

The student must

- check tires, lubrication, levels and operation of cooling system, fan belts, fans, and hoses, and check the radiator for debris.
- carry an ample supply of drinking water.
- inspect tires frequently.
- avoid leaving the vehicle if it is disabled in the desert.

Knowledge Objectives: Hot Weather

The student must know

- procedures for hot weather driving.
- the hazards of hot weather driving.
- the effect of hot weather upon vehicle operation.
- the effect of hot weather upon tire pressure and tire life.

Skill Objectives: Hot Weather

No new objectives.

Attitude Objectives: Hot Weather

The students must believe

- hot weather can impede vehicle operation.

- special precautions are required in inspecting the vehicle and preparing it for hot weather operation.
- it is dangerous to leave a vehicle when it is disabled in the desert.

Performance Objectives: Mountains

Students must

- check brake adjustment prior to mountain driving.
- use right lane or special truck lane going up grades.
- place transmission in appropriate gear for engine braking before starting downgrade.
- use proper braking techniques and maintain proper engine braking before starting downgrades.
- use special speed reduction devices properly, e.g., engine exhaust brakes.
- use truck escape ramp, if available, when brakes fail on a downgrade.
- observe temperature gauge frequently when pulling heavy loads up long grades.

Knowledge Objectives: Mountains

Students must know

- the effect of vehicle weight and speed upon braking and shifting ability on long downgrades.
- the function and value of escape ramps.
- the meaning and use of percent of grade signs.

Skill Objectives: Mountains

Students must

- utilize proper downhill gearing.
- operate braking system for maximum efficiency and safety.

Attitude Objectives: Mountains

Students must believe

- o the weight of the truck poses hazards in long downgrades unless the truck is put into proper gear.
- o attempting to downshift on steep decline is too dangerous to attempt.
- o use of a truck escape ramp is safer than attempting to negotiate a downgrade when the vehicle is out of control.

INSTRUCTIONAL METHODS

Classroom

A total of 3.25 hours are required and must include presentation of information on hazards presented by extreme conditions, procedures for handling extreme conditions, and the consequences of using improper gear on downgrades.

Lab

None.

Range

A minimum of 4.0 hours may be devoted to range or lab instruction and must include demonstration of the proper attachment and use of tow chains and cables to extricate a mired vehicle from mud, sand, and snow and proper mounting of snow chains.

Street

None.

NOTE: While it is impossible to schedule on-street sessions for extreme conditions, instructors should take advantage of adverse weather conditions to allow practice in vehicle operation to the extent it is safe to do so. If mountainous, hilly terrain, or desert areas are available, instructors may make use of them in other scheduled on-street sessions.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by written materials and visuals to present information on extreme conditions and procedures for operating in extreme conditions, including projected visuals or classroom models to demonstrate the effects of slippery surfaces upon vehicle control and to show the effective use of an escape ramp.

Equipment

Range instruction requires tire chains and tow cables and chains.

UNIT 2.7 PROFICIENCY DEVELOPMENT: SAFE OPERATING PROCEDURES

PURPOSE

This unit provides students an opportunity to refine, within the highway traffic environment, their vehicle handling skills learned in Units 1.4, 1.5, 1.8, and the safe and fuel efficient operating practices learned in Units 2.1 through 2.6. Student performance will be closely monitored on progress toward the level of proficiency required for carrying out the basic highway traffic maneuvers of lane changing, passing, merging, turning and parking. The instructor will guide students in developing a specific set of procedures for carrying out each of the maneuvers.

HOURS OF INSTRUCTION

Each school will devote a minimum 71.5 hours to the development of proficiency in safe operating procedures through on-street driving.

INSTRUCTIONAL OBJECTIVES

Performance, Knowledge, Skill and Attitude Objectives

This unit introduces no new objectives. The 70.5 hours (required minimum time) of in-vehicle instruction provided in this unit are intended to allow students to develop their proficiency relative to all prior objectives to a level needed to pass the Street Test portion of the Final Examination Test Battery.

INSTRUCTIONAL METHODS

Classroom

A minimum of 1.0 hour must be spent in classroom instruction, including instruction on correct procedures for the various driving maneuvers, student safety rules, use of checklists and observation time activity.

Lab

None.

Range

None.

Street

A minimum of 70.5 hours must be allocated to street instruction time, during which each student must receive 23.5 hours of BTW time and 47.0 hours of street observation time (using a three to one student/instructor ratio).* The BTW time must take place in a full range of traffic environments, including urban and rural uncontrolled roadways, expressways or freeways, and light, moderate and heavy city traffic. At least 16.0 hours shall be night driving, both in city and open highway environments. Where State laws permit, the final 10.0 hours may take place in the absence of an instructor. "Solo" operations, however, shall be used only for qualified students who shall be accompanied by another student acting as an observer and using checklists to monitor performance.

*NOTE: In this unit, student/instructor ratios of 1:1, 2:1 and 4:1 may be used instead of the 3:1 ratio specified. Minimum student requirements for these other ratios may be found under "Time Waivers and Optional Lesson Requirements" (including a definition of street observation time) in the General Curriculum Standards.

SUPPORT REQUIREMENTS

Materials

Items required are

- appropriate types of driver's motor vehicle licenses or learner permits.
- full student compliance with the Federal Motor Carrier Safety Regulations (if the training lesson involves interstate travel).
- performance rating forms (e.g., checklists) for both student observers and instructor use.

Equipment

All vehicles used in this unit must be carefully inspected, roadworthy, properly licensed/permitted and insured. The tractor used for this activity should accommodate an instructor and three students in a way that will allow everyone to see clearly the driver (e.g., head movements, signaling) and the road. The vehicle cab design characteristics meeting this requirement are specified in the Training Equipment and Materials Standards.

The training vehicles shall be laden for a minimum of 35.0 hours of this unit and shall be loaded with either real or dummy cargo to a minimum 15,000 pound payload. The purpose of this requirement is to

Notes:

SECTION 3 - ADVANCED OPERATING PRACTICES

This section introduces higher level skills that can be acquired only after the more fundamental skills and knowledges taught in sections 1 and 2 have been mastered. The purpose of the units is to teach the perceptual skills necessary to recognize potential hazards and to develop the manipulative skills needed to handle a vehicle in an emergency and to recover from skids. Three units comprise this section:

Unit 3.1 - Hazard Perception

Unit 3.2 - Emergency Maneuvers

Unit 3.3 - Skid Control and Recovery

UNIT 3.1 HAZARD PERCEPTION

PURPOSE

Classroom instruction and exercises in recognizing hazards early enough to prevent them from becoming emergencies.
On-street driving sessions involving application of hazard recognition principles.

HOURS OF INSTRUCTION

Each school must devote a minimum 7.50 hours to instruction in hazard perception.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to identify road conditions and road users that are a potential threat to the safety of the tractor-trailer driver.

Knowledge Objectives

Students must know

- o the visible characteristics of road conditions that present a hazard to safe operation, including slippery, soft, slopping, or uneven surfaces, debris, dangerous curves, obstructions to visibility, and locations where there are likely to be strong crosswinds.
- o the characteristics of other road users (drivers or pedestrians) that make them potentially dangerous, including obstructed vision, distraction, confusion, impatience, impairment, and low speed.
- o activities of other road users that provide clues to potential danger, including head and body movement, vehicle movement, and conflict situations.

Skill Objectives

Students must perceive immediately a potential threat by the visible

characteristics and actions of other road users and initiate prompt defensive or evasise action.

Attitude Objectives

Students must believe

- o most hazards can be detected in time to avoid a collision.
- o serious hazards are encountered frequently enough to require constant attention of the driver.
- o any delay in reponding to a perceived hazardous situation can result in an accident.

INSTRUCTIONAL METHODS

Classroom

A minimum of 1.5 hours is required and must include student response to simulated hazardous situations and a review of commentary driving techniques.

Lab

None.

Range

None.

Street

A minimum of 6.0 hours is required during which each student must have a minimum of 2.0 hours BTW on the street exposed to potential traffic conflict, e.g., heavy, fast moving traffic. At least 0.5 hours of the BTW time must involve commentary type driving. BTW time may be reduced to one hour if accompanied by two hours in a simulator in which hazards are realistically simulated and drivers' responses monitored and critiqued. BTW time may be reduced also if two hours are devoted to critique of videotaped student driving performance.

READEX FICHE

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by projected dynamic visuals or sequential static visuals portraying, from the driver's point of view, the hazards most commonly encountered by tractor-trailer drivers. Also required are printed or visual materials that describe common hazards and the frequency with which they are encountered, and materials that review techniques of commentary driving.

Street instruction must be supported by materials and equipment to permit instructor and observer critique, such as observer checklists or videotape camera/recorder.

Equipment

Videotape Camera/Recorder (Optional).

UNIT 3.2 EMERGENCY MANEUVERS

PURPOSE

Classroom discussion of emergency braking techniques, evasive actions and responses to other emergencies.
Emergency stopping and evasive actions practiced on driving range.

HOURS OF INSTRUCTION

Each school must devote a minimum 5.5 hours of instruction in emergency maneuvers, including brake failures, front wheel tire blowouts, emergency stops, and evasive maneuvers.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

The student must be able to

- bring the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface.
- perform a quick evasive turn on a dry surface.
- make an evasive turn off the roadway and return to the roadway while maintaining directional control.
- bring the vehicle to a stop in the event of a brake failure.
- maintain control of the vehicle in the event of a blowout.

Knowledge Objectives

The student must know

- that the vehicle can be turned more quickly than it can be stopped.
- that in an impending head-on collision, it is generally safer to leave the roadway than to strike another vehicle.
- procedures for quick stops, quick turns, and evasive turns off the roadway.

- procedures for handling brake failure and blowouts.

Skill Objectives

The student must

- use brakes in a manner that will stop the vehicle in the shortest possible distance while maintaining directional control.
- turn the steering wheel 180° in either direction quickly while maintaining a grip on the steering wheel.

Attitude Objectives

Students must believe

- a driver should never give up in efforts to cope with an emergency.
- it is safer to leave the road than to risk a head-on collision with another road user.

INSTRUCTIONAL METHODS

Classroom

A minimum of 1.50 hours instruction is required and must include descriptions and demonstrations of emergency procedures and range safety precautions.

Lab

None.

Range

A minimum of 4.0 hours is required during which each student must have a minimum of 1.25 hours BTW in practice of full emergency stops, evasive maneuvers, and off-road recovery.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials to present information on physical principles involved in emergency maneuvers, recovery procedures, and range precautions, and by dynamic visuals to demonstrate emergency maneuvers and recovery procedures.

Equipment

Range instruction must be supported by equipment or markings to create maneuvering requirements.

UNIT 3.3 SKID CONTROL AND RECOVERY

PURPOSE

Classroom instruction on causes of skidding and jackknifing and techniques for avoiding and recovering from skids and jackknifes.
Students develop skills in skid prevention and recovery during skid pan training exercises.

HOURS OF INSTRUCTION

Each school must devote at least 9.0 hours* of instruction to skid control and recovery.

INSTRUCTION OBJECTIVES

Performance Objectives

The student must be able to

- o maintain directional control while operating over a slippery surface.
- o bring tractor-trailer to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface.
- o recover from incipient tractor or trailer skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces.

Knowledge Objectives

The student must know

- o the role of skid control in preventing accidents.
- o skid dynamics, including friction, wheel load and force.
- o causes of skidding.

* 7.75 hours under range training is optional.

- o the characteristics of a trailer jackknife, front wheel skids and all wheel skids.
- o skid recovery procedures.

Skill Objectives

The student must

- o countersteer out of a skid in a way that will regain directional control and not produce another skid.
- o operate brakes properly to provide maximum braking without loss of control.
- o judge maximum safe speed for slippery surface conditions.

Attitude Objectives

Students must believe

- o most skids are preventable.
- o skids can occur at any speed.
- o it is possible to recover from skids if they are detected and corrected promptly.

INSTRUCTIONAL METHODS

Classroom

A minimum 1.25 hours is required and must include presentation of information on physical principles involved in skid control, recovery procedures, and skid pan safety precautions.

Lab

None.

Range

A minimum of 7.75 hours* is required, during which each student must have a minimum of 2.5 hours BTW on the range in practice of skid control and recovery.

Street

None.

*NOTE: Range (skid pan) training in this unit is optional. Schools providing the full 2.5 hours of BTW time in this unit may elect (if desired) to reduce the BTW time in unit 2.7 - "Proficiency Development: Safe Operating Procedures" by up to 4.0 hours per student. For details, see "Time Waivers and Optional Lesson Requirements" under the General Curriculum Standards.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials presenting information on physical principles, skid control and recovery procedures, and skid pan precautions, and by dynamic visuals demonstrating skid control and recovery procedures.

Equipment

Range instruction must be supported by a tractor-trailer equipped with (1) instructor-operated trailer brakes and (2) an antijackknife device that does not interfere with instructional methods. See Training Equipment and Material Standards for details. For details of required range facilities, see School Facilities Standards.

SECTION 4 - VEHICLE MAINTENANCE

This section covers the activities required to keep the vehicle in safe and efficient operating condition over and above the fundamental activities dealt with in section 1.

The purpose of this section is to teach the student to perform simple maintenance tasks and to initiate those complex activities that must be performed by qualified mechanics. Three units comprise this section:

Unit 4.1 - Vehicle Systems

Unit 4.2 - Preventive Maintenance and Servicing

Unit 4.3 - Diagnosing and Reporting Malfunctions

UNIT 4.1 VEHICLE SYSTEMS

PURPOSE

Classroom instruction on function and operation of all key vehicle systems, e.g., engine, engine auxiliary systems, brakes, drive train, coupling systems, suspension, etc. Instructor gives detailed description of each system, its importance to safe and efficient operation and that needed to keep system in good operating condition.

HOURS OF INSTRUCTION

Each school must devote a minimum 13.25 hours to instruction in vehicle operating systems and their components.

INSTRUCTIONAL OBJECTIVES

This unit is intended primarily to provide knowledge that is required for the remainder of the units in this section.

Performance Objectives

None.

Knowledge Objectives

Students must know the location, function, operation, and common failures of the following vehicle components:

- Frames, Suspension, and Axles
- Engines
- Fuel Systems
- Air Intake and Exhaust Systems
- Lubrication Systems
- Cooling Systems
- Electrical Systems
- Drive Trains

- o Brake Systems
- o Wheels, Bearings, Rims and Tires
- o Steering Systems
- o Coupling Systems

Skill Objectives

None.

Attitude Objectives

None.

INSTRUCTIONAL METHODS

Classroom

A minimum of 11.25 hours must be devoted to classroom instruction in vehicle systems and must include presentation of information describing location, function, and theory of operation of vehicle components.

Lab

A minimum of 2.0 hours must be devoted to lab instruction and must include instructor demonstration of location of vehicle components and student identification and location of parts and recognition of normal and malfunctioning parts.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by printed materials,

transparencies, and static visuals to describe and illustrate the location, function, and operation of vehicle components, and by the dynamic visuals to demonstrate internal operation.

Equipment

Classroom instruction must be supported by models, cutaways, or actual components to demonstrate location and internal operation. Lab instruction should involve several different types of tractor-trailers to demonstate as wide a range as possible of engines, drive trains, axle arrangements, brake systems and coupling devices. If possible, this unit should be taught at a vehicle servicing facility with servicing pit or vehicle hoist so that students can get a clear view of components from the underside of the vehicle.

UNIT 4.2 PREVENTIVE MAINTENANCE AND SERVICING

PURPOSE

Supervised student practice in vehicle servicing, including checking engine fluids, changing fuses, checking tire inflation, changing tires, draining air tanks and adjusting brakes.

HOURS OF INSTRUCTION

Each school must devote a minimum 8.75 hours to instruction in preventive maintenance and repair.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- o check and service engine fuel, oil, coolant, battery, and filters.
- o perform simple emergency repairs to enable a vehicle to reach a maintenance facility.
- o check tire air pressure.
- o change wheels (with tires mounted) and check for proper tire and wheel mounting.
- o drain moisture from air brake supply reservoirs and fuel system.
- o check and adjust brakes.
- o clean and repair lights.
- o change fuses and reset circuit breakers.

Knowledge Objectives

Students must know

- o the procedures for performing inspections and authorized maintenance and repairs.

- to avoid attempting repairs for which they are unqualified.
- the importance of periodic inspection and repair to prevent enroute breakdowns, longevity of parts, safety, and economy of operation.
- the inspection, repair and maintenance requirements of the Federal Motor Carrier Safety Regulations.

Skill Objectives

None.

Attitude Objectives

Students must believe

- preventive maintenance and repair will prevent enroute breakdowns and ensure longevity of parts, safety, and economy of operation.
- it is the driver's responsibility to ensure that the vehicle is in safe, economical operating condition.

INSTRUCTIONAL METHODS

Classroom

A minimum of 1.25 hours must be devoted to instruction in the importance of preventive maintenance and servicing in the prevention of breakdowns, increasing the life of the vehicle systems and their components, and improving the safety and economy of operation.

Lab

Each school must devote 7.50 hours to instruction in the lab, and must include instructor demonstration and student practice in preventive maintenance and repair, changing tires and adjusting brakes.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Preventive maintenance checklists and a broad range of tractor and trailer manufacturers' service manuals.

Equipment

Range instruction must be supported by tools and supplies necessary for instructor demonstration and student practice.

UNIT 4.3 DIAGNOSING AND REPORTING MALFUNCTIONS

PURPOSE

Classroom instruction on identification of vehicle malfunctions. Students provided a series of exercises in which they will troubleshoot problems and perform emergency repairs.
Students will practice performing emergency starting procedures.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.0 hours to instruction in diagnosing and reporting malfunctions.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- o identify vehicle systems or components that are functioning properly, are in imminent danger of failing, or functioning improperly.
- o describe symptoms of improper operation completely and accurately to maintenance personnel.
- o start vehicles with dead batteries or without air pressure (if equipped with air starters).

Students must

- o avoid attempting to perform maintenance for which they are unqualified.
- o properly report breakdowns occurring enroute.

Knowledge Objectives

Students must know

- o the procedures for starting vehicles with dead batteries or without air pressure.

- the symptoms of improper operation revealed through instruments, vehicle operation characteristics, sight, sound, feel and smell.

- the danger of exceeding maintenance restrictions imposed by the employer or the driver's skill limitations.

Skill Objectives

None.

Attitude Objectives

Students must believe

- drivers and mechanics must work together as a team to achieve safe economic operation for maximum job security.

INSTRUCTIONAL METHODS

Classroom

A minimum of 3.0 hours is required and must include instructor presentation and student discussion of symptoms of improper operation.

Students are not expected to become mechanical experts. However, they should be able to identify sources of vehicle malfunctions well enough to enable mechanics to perform necessary diagnosis (in shop) or to come to the scene of a road breakdown with necessary tools and parts to correct problem.

Lab

A minimum of 1.0 hour is required and must include instructor demonstration of starting vehicles with dead batteries or without air pressure.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials and visuals to describe and illustrate symptoms of improper operation, e.g., "trouble-shooting" charts.

Equipment

Jumper cables and air lines.

SECTION 5 - NONVEHICLE ACTIVITIES

This section covers activities not directly related to the vehicle itself but which must be performed by tractor-trailer drivers. Its objective is to see these auxiliary activities are performed in a way that assures safety to the driver, the vehicle, cargo, and other road users. Seven units comprise this section:

Unit 5.1 - Handling Cargo

Unit 5.2 - Cargo Documentation

Unit 5.3 - Hours of Service Regulations

Unit 5.4 - Accident Procedures

Unit 5.5 - Personal Health and Safety

Unit 5.6 - Trip Planning

Unit 5.7 - Public and Employer Relations

UNIT 5.1 HANDLING CARGO

PURPOSE

Basic principles of loading and unloading cargo, including weight distribution and techniques for securing and covering cargo. Practice loading a vehicle under instructor's supervision.
Visit to local freight handling company to observe operations.

HOURS OF INSTRUCTION

Each school must devote a minimum 9.0 hours* to instruction in handling cargo.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- load and unload cargo safely and efficiently.
- ensure that the weight and distribution of the load meet legal and safety requirements.
- secure loads properly.
- mount placards when carrying hazardous materials.

Knowledge Objectives

Students must know

- procedures for unloading and loading.
- procedures for securing cargo, including methods of blocking, bracing, packing, stacking, and use of straps, rope, cable, chains and chain binders for tiedown to prevent damage and accidents.

* 2.0 hours under lab instruction is optional.

- o the nature, function, and operation of common cargo handling equipment, including pallets, jacks, dollies, handtrucks, forklift trucks, nets, slings, rug poles, and other equipment.

- o categories of hazardous materials, the need for specialized training to handle hazardous materials, and placard and other paperwork requirements.

- o Federal and State regulations on loading, weight limits, and distribution of cargo.

- o the consequences of improper loading and unloading, overloading, and improper weight distribution.

- o categories of and procedures for handling unstable freight.

Skill Objectives

Students must

- o safely operate common types of cargo handling equipment.

- o select proper sizes of chain, cable, nylon webbing, steel strapping or rope.

- o secure chains, cables, webbing, and strapping correctly and tie appropriate knots.

- o block and brace cargo properly.

Attitude Objectives

Students must believe

- o proper handling and securing of cargo is necessary for the protection of the cargo, other road users, the vehicle, the driver, and the employer.

- o it is the driver's responsibility to assure that cargo is properly handled.

INSTRUCTIONAL METHODS

Classroom

A minimum of 5.0 hours is required and must include description of proper procedures for handling and securing various types of cargo, cargo handling equipment, cargo tie-down devices, weight distribution on vehicles and hazardous cargo placarding requirements.

Lab

A total of 4.0 hours for lab instruction is required, of which 2.0 hours is optional. The required 2.0 hours shall include instructor demonstration and student practice in the actual loading and securement of simulated cargo. The optional 2.0 hours is for a field trip to a local freight terminal to observe types of cargo handling equipment and procedures for loading/unloading various types of cargo.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials (e.g., various types of chain binders, chains and ropes) to present information encompassed by all knowledge requirements and by visuals to demonstrate procedures and illustrate the hazards of improper handling.

Equipment

Range instruction must be supported by common cargo handling equipment and materials for securing cargo. Real or simulated cargo for loading/unloading on a flat bed trailer is required.

UNIT 5.2 CARGO DOCUMENTATION

PURPOSE

Classroom discussion of basic forms and procedures required when driver handles cargo, e.g., bills of lading and other freight documentation. Basic procedures and responsibilities for hazardous materials cargo.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.75 hours to instruction in cargo documentation.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- o verify nature, amount, and condition of cargo on both pickup and delivery.
- o verify information on bill of lading and properly record and report discrepancies and damage to the cargo.

Students must

- o obtain appropriate signatures on delivery receipts and other required forms.
- o properly prepare a manifest.
- o meet requirements for hazardous materials and waste documentation.

Knowledge Objectives

Students must know

- o the procedures for proper completion of freight bill, cargo manifest, bill of lading, and other required forms.
- o the driver's responsibilities for ensuring paperwork is properly filled out.

- possible consequences of improperly completed documentation.

Skill Objectives

Student must be able to perform basic mathematical calculations to conduct accurate cargo counts.

Attitude Objectives

Students must believe

- it is necessary that forms be completed accurately to prevent theft or claims.
- hazardous materials documentation must be properly completed for public health and safety and for company compliance with law.
- penalties for noncompliance with hazardous materials regulations can be very severe for both driver and employer.

INSTRUCTIONAL METHODS

Classroom

A minimum of 4.75 hours is required and must include presentation of information on the nature of documentation, forms and procedures for completing them, and on the driver's responsibilities, demonstration of forms completion and student practice, and information on importance of proper completion and consequences of improper completion.

Lab

None.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by printed materials or visuals to present information on documentation; transparencies, wall charts, etc., to enable instructor to demonstrate completion; and copies of documents for student practice.

Equipment

None.

UNIT 5.3 HOURS OF SERVICE REQUIREMENTS

PURPOSE

Classroom instruction in permissible hours of duty, rest periods, and other requirements of Federal Hours of Service Regulations. Introduction and practice using driver's duty status record to record time. Use of duty status record to record time used for remainder of course.

HOURS OF INSTRUCTION

Each school must devote a minimum 5.75 hours to instruction in Federal Motor Carrier Safety Regulations, Part 395 - "Hours of Service Regulations" for drivers.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- o comply with Hours of Service Regulations.
- o maintain a complete, neat, and accurate driver's duty status record and recap.

Knowledge Objectives

Students must know

- o all the requirements of Part 395 of the FMCSR covering Hours of Service.
- o how to comply with the Hours of Service Regulations.
- o the procedures for completing driver's duty status record.
- o the procedures for using a logbook recap.
- o the consequences of failure to comply with Hours of Service Regulations.

Skill Objectives

Students must

- o interpret hours of service categories correctly.
- o perform mathematical calculations necessary to recap and apply totals to the Hours of Service Regulations.
- o determine driving hours remaining on a particular day or tour of duty.

Attitude Objectives

Students must believe

- o compliance with Hours of Service Regulations is for their own safety.
- o keeping accurate records and complying with Hours of Service Regulations is the driver's responsibility.
- o they subject themselves and their employers to prosecution if they fail to keep logs accurately and to comply with regulations.

INSTRUCTIONAL METHODS

Classroom

A minimum of 5.75 hours is required which must include instructor presentation of information on regulations and procedures, demonstration of procedures for completing logs, and student practice in filling out logs based upon hypothetical information supplied by the instructor.

Lab

None.

Range and Street

In addition to the classroom instruction, students will be required to keep accurate driver's duty status records of all activities during the remainder of the training course or for 30 days, whichever comes first. This unit should be scheduled early enough to permit use of records during the majority of the course to gain practice and to monitor the amounts of required range and street BTW requirements.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by materials to present information on Hours of Service Regulations and procedures for completing duty status records, including visuals such as classroom blowups of hours of service records for instructor demonstration, work sheets and records for student practice in filling out records and visuals to illustrate logging procedures.

Equipment

None.

UNIT 5.4 ACCIDENT PROCEDURES

PURPOSE

Basic instructions for handling the scene of an accident, reporting accidents, rules and regulations related to accidents. Introduction to use of fire extinguishers and basic firefighting techniques, expecially those related to truckers, e.g., tire fires.
Range or classroom demonstration in which instructor demonstrates use of fire extinguisher.

HOURS OF INSTRUCTIONS

Each school must devote a minimum 13.75 hours* to instruction in accident and emergency procedures.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- o guard the scene of an accident to prevent further injury or damage, and obtain assistance.
- o obtain all information needed for accident reports to the BMCS, the State, the employer, and the insurance company.
- o render assistance to any injured parties, including providing first aid, providing he/she has had proper training.
- o extinguish fires including cargo, engine, electrical, and tire.
- o avoid discussions of legal questions (e.g., liability).

Knowledge Objectives

Students must know

- o Federal and State laws and company requirements dealing with stopping and rendering assistance at the scene of an accident.
- o procedures for protecting the scene of an accident and Federal and State requirements for same.

* 10.0 hours under classroom instruction is optional.

- o Federal, State, insurance company, and employer requirements regarding accident reporting.
- o types of fire extinguishers appropriate to each class of fire.
- o procedures for extinguishing cargo, engine, electrical, and tire fires.
- o where to stop the vehicle in the event of a fire.

Skill Objectives

Students must be able to

- o operate fires extinguishers correctly to put out fires.
- o correctly apply first-aid procedures to the injured, but only if trained to do so.

Attitude Objectives

Student must believe

- o leaving the scene of an accident and/or failure to report an accident is illegal and can have serious consequences.
- o it is dangerous to attempt to render first-aid without proper training.
- o drivers have an obligation to avoid actions that may have legal consequences for their employers.

INSTRUCTIONAL METHODS

Classroom

A minimum of 13.0 hours* is allocated to include presentation of information on accident procedures, fire prevention and fire fighting. The 13.0 hours includes the American Red Cross course in "Essential First-Aid and Cardiopulmonary Resuscitation (CPR)," an optional 10.0 hour program. If the American Red Cross program is not used, a school may elect to provide 2.5 hours of classroom instruction in basic first-aid, taught by a certified first-aid practitioner. Since first-aid training is optional, the minimum classroom time required is 3 hours.

Lab

A minimum of .75 hour is required for a "live" demonstration of fire extinguishers.

Range

None.

Street

None.

*NOTE: The 10.0 hours allocated under classroom instruction for the American Red Cross course in Essential First-Aid and CPR is optional. Schools that elect to offer this course have the option of reducing classroom time in unit 5.5 by 1.5 hours and in unit 5.7 by up to 1.0 hour. For details, see "Time Waivers and Optional Lesson Requirements" under the General Curriculum Standards.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by printed and visual materials that describe and demonstrate correct procedures. Sample forms should be provided for student practice. Limited first-aid materials should be provided for student practice if first-aid training is offered.

Equipment

Lab instruction will require equipment and materials for controlled fires and fire extinguishers.

UNIT 5.5 PERSONAL HEALTH AND SAFETY

PURPOSE

Classroom instruction on physical requirements for driving an interstate vehicle, medical examination and certification. Discussion of basic health maintenance requirement, diet, exercise, use of alcohol, drugs and avoidance of fatigue. Discussion of common nondriving safety hazards and use of special equipment, e.g., gloves, hard hats, goggles, equipment used with hazardous material.

HOURS OF INSTRUCTION

Each school must devote a minimum 5.0 hours to instruction in personal health and safety.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- o not use alcohol and drugs that would affect their driving functions, before operating a truck.
- o use proper diet, exercise, and rest to remain alert while driving.
- o minimize fatigue through proper rest while off-duty and use of rest stops enroute.
- o obtain regular vision, hearing, and health checkups.
- o use seat belts and personal protection gear appropriate to type of operation.
- o use safe lifting procedures.
- o wear proper clothing for cold, hot, and adverse weather conditions.
- o use techniques to avoid unsafe situations that might result in robberies, hijacking, or pilferage.

Knowledge Objectives

Students must know

- the effects of alcohol, drugs, poor diet, fatigue, poor vision, hearing and general health upon safe operation.
- the function of protective gear (seat belts, hard hat, respirators, etc.) in prevention of injury.
- Federal and State regulations governing physical requirements.
- the importance of staying with a disabled vehicle when stranded during adverse weather conditions.
- the background and character requirements for being a safe and successful truck driver.
- procedures for safe lifting.
- procedures for securing truck in emergency stops.

Skill Objectives

None.

Attitude Objectives

Students must believe

- safe operation of a motor vehicle demands that the operator be physically and mentally fit.
- physical and mental fitness requires proper rest and diet, good health, and avoidance of alcohol and other drugs.
- seat belts are for their protection and should always be worn.

INSTRUCTIONAL METHODS

Classroom

A minimum of 5.0 hours is required and must include presentation of information relative to knowledge objectives, the effect of physical condition, drugs and alcohol on safety of operation, ways to avoid on the job injuries, use of personal protective equipment and Federal regulations pertaining to driver's physical condition.

Lab

None.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by printed materials to show the relationship to safe driving, such as factors of health, vision, hearing, proper rest and avoidance of alcohol and drugs.

Equipment

Display samples of safety equipment such as face shields, shin guards, respirators, goggles, dust masks, splash aprons and special gloves.

UNIT 5.6 TRIP PLANNING

PURPOSE

Classroom discussion of importance of and requirements for planning trips, Federal and State requirements on need for permits, vehicle size and weight limitations, etc.
Classroom exercise in which students plan an overnight trip with school vehicle, including identification of permits, estimating time of arrival, fuel stops, etc.

HOURS OF INSTRUCTION

Schools must devote a minimum 4.75 hours to trip planning.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must be able to

- plan a route from one point to another that is optimal in terms of travel time, fuel costs, potential hazards, and Federal, State and local travel restrictions.
- arrange to secure permits required by the nature of the vehicle, its cargo, and route to be traveled.
- arrange a secure place for the vehicle on layovers, especially when transporting high value or hazardous materials cargo.

Knowledge Objectives

Students must know

- the types of vehicles, cargos, and routes requiring special permits.
- State requirements and the procedures for obtaining special permits.
- common map symbols.

- o procedures for route planning, including preparing paperwork, route selection, estimating time, fuel, money and personal needs.
- o Federal, State and local laws and restrictions on vehicle size and weight.

Skill Objectives

Students must

- o interpret maps correctly.
- o estimate travel time and plan rest stops and layovers.
- o estimate fuel consumption and plan fuel stops.
- o estimate expense money and obtain funds and/or credit cards.

Attitude Objectives

Students must believe

- o effective route planning is essential.
- o failure to obtain necessary permits can result in extensive delay and stiff fines.

INSTRUCTIONAL METHODS

Classroom

A minimum of 4.75 hours is required and must include presentation of information on the most effective and efficient routing between pickup and delivery points, or start and destination with minimum safety risks and compliance with Federal, State and local commercial vehicle requirements. The consequences of inefficiency and the additional safety risks in failing to adequately plan routes and routing are stressed.

Lab

None.

Range

None.

Street

None.

SUPPORT REQUIREMENTS

Materials

Classroom instruction must be supported by transparencies or individual class handouts including maps for route planning, illustrative samples of special permits, copies of various State size and weight regulations and port-of-entry requirements.

Equipment

None.

UNIT 5.7 PUBLIC AND EMPLOYER RELATIONS

PURPOSE

Classroom instruction and discussion on maintaining a good image, public relations problems of trucking industry, dealing with public and customers, and relationship to employer, including how to look for a job, get a job and keep a job.
Student practice interviewing for a job.

HOURS OF INSTRUCTION

Each school must devote a minimum 4.25 hours* to public and employer relations.

INSTRUCTIONAL OBJECTIVES

Performance Objectives

Students must

- o be courteous to other drivers by avoiding unnecessary use of the horn, not blocking driveways and entrances, and pulling to the side of the road (when necessary) to allow faster vehicles to pass.
- o interact tactfully with customers and the general public by referring problems to the company.
- o maintain a neat personal appearance on duty and when being interviewed for a job.
- o fill out job application forms properly and be adequately prepared for job interviews.
- o lend assistance to the motorists when permitted by company policy.

* 0.75 hour under classroom instruction is optional.

Knowledge Objectives

Student must know

- o the direct and indirect effects of unsafe and discourteous acts upon the public's image of the employer and the trucking industry.
- o the proper procedure for handling complaints by the general public and customers.
- o job qualifications and advancement opportunities for truck drivers.
- o steps in the job application process.

Skill Objectives

None.

Attitude Objectives

Students must believe that

- o as professional drivers they must be the most safe and courteous drivers on the road.
- o their employer's rules and regulations take precedence over any procedures taught by the school.
- o discourtesy to other drivers, customers, and the general public can jeopardize employment and the image of the company and the trucking industry.
- o retaliation for unsafe or discourteous acts of other drivers only compounds the situation.
- o the best response to unsafe or discourteous acts of other drivers is to avoid retaliation and immediately increase the distance from their vehicles.

INSTRUCTIONAL METHODS

Classroom

A total of 4.25 hours* is required and must include presentations illustrating the effects of public relations, group discussion of public relations, and role playing exercise involving driver-customer relations, to make students aware of their highly visible and important role in representing the trucking industry. Employee/employer relations are also discussed, including job qualifications and practice in handling job interviews.

The classroom time includes an optional 0.75 hour presentation by a guest lecturer from the local trucking industry. Therefore, the minimum required classroom time is 3.5 hours.

Lab

None.

Range

None.

Street

Examples of discourtesy that occur during street sessions should be called to students' attention and consequences discussed.

*NOTE: The 0.75 hour classroom time allocated to a guest lecturer, representative of the local trucking industry, to discuss employment opportunities, hiring procedures and promotional opportunities is not required. However, it is recommended as a valuable aid to student job attainment.

SUPPORT REQUIREMENTS

Materials

Classroom instruction may be supported with films illustrating the effects of good and bad public relations. Samples of various job application forms may be used.

Equipment

None.

TRAINING SCHEDULE STANDARDS

TRAINING TIME REQUIREMENTS

1. The minimum time required to complete this curriculum is 320 hours (8 consecutive weeks) of 5 days each, with a daily limitation of 8 hours of training to be completed within 10 consecutive hours, subject to student/instructor ratios chosen (see Student/ Instructor Ratios Standards).

2. Full-time training described above is recommended, but not mandatory, part-time training programs, e.g., nights, weekends, etc., are permissible as long as all of the requirements of these Training Standards are met.

3. The 8 hour daily maximum training specified in item one above is recommended, not mandatory. However, training days lasting longer than 8 hours are of very questionable value because of student fatigue. Furthermore, 8 hour training days will of necessity have to contain breaks or rest periods and provide time for rotating students from classroom to range to street lessons. Thus an 8 hour training day quickly becomes a 10 hour day. A recommended sample daily training schedule may be found on the following page. While this is only a recommendation, it would appear to be the maximum for productive student learning.

   The required nighttime street training lessons, and/or the extended student road training trips (optional), will require an adjustment of such schedules, but in no case shall students be subjected to hours exceeding those specified in Part 395 - Hours of Service of Drivers, in the Federal Motor Carrier Safety Regulations.

4. Home study or correspondence-type courses may be utilized to prepare students for in-residence training. However, the full 320 hour residency training requirements must be met except as provided for in the General Curriculum Standards under allowable Time Waivers for Classroom Time.

DAILY OPERATION SCHEDULE (SAMPLE)

Class Time

Period	Start-End	Subject	Training Hours
1.	07:45 - 08:00	Written quiz on previous day's work and turn in previous day's duty status record	-
	08:00 - 08:05	Break	-
2.	08:05 - 09:05	Next subject in sequence	1
	09:05 - 09:10	Break	-
3.	09:10 - 10:10	Next subject in sequence	1
	10:10 - 10:15	Break	-
4.	10:15 - 11:15	Next subject in sequence	1
	11:15 - 11:20	Break	-
5.	11:20 - 12:20	Next subject in sequence	1
	12:20 - 13:10	Lunch Break	-
6.	13:10 - 14:10	Next subject in sequence	1
	14:10 - 14:15	Break	-
7.	14:15 - 15:15	Next subject in sequence	1
	15:15 - 15:25	Break	-
8.	15:25 - 16:25	Next subject in sequence	1
	16:25 - 16:30	Break	-
9.	16:30 - 17:30	Next subject in sequence	1
	17:30 - 17:35	Break	-
10.	17:35 - 17:50	Service and secure vehicles, prepare daily vehicle condition reports and complete driver's duty status record.	
	Totals	8 Subjects	8 Hours

INSTRUCTOR QUALIFICATION STANDARDS

OVERVIEW

The foundation of all successful training programs is a competent instructor. The instructor brings together the facilities, materials, and equipment needed to attain the objectives of the training program. The instructor is responsible for making sure that learning occurs according to the philosophy and resources of the institution which he or she represents. A competent instructor helps students learn effectively and efficiently. The instructor's skill as well as personality all contribute to the success in achieving the objectives of the training program.

The ideal instructor is the one who can perform all instructional jobs efficiently. However, no one instructor will possess all the competencies or have all the abilities necessary to prepare tractor-trailer operators. What is needed is a mix of instructor skills and capabilities appropriate for attaining the objectives of the curriculum. To provide a competent cost-efficient staff, three categories of instructional personnel are required: Instructor, Assistant Instructor, and Lecturer.

Instructor-The instructor is responsible for overall management of student learning. The instructor is responsible for ensuring that students learn by gauging the effectiveness of instructional methods and materials, directing the efforts of other instructional staff, maintaining records, and interacting effectively with school management to bring the necessary resources to the learning environment.

Assistant Instructor-The assistant instructor must understand the subject matter of the curriculum, provide instruction under the supervision of an instructor, and work effectively with students in the development of student competencies and skills. The assistant instructor must be capable of carrying on several tasks under the general supervision of the instructor. These tasks include conducting practice exercises introduced by the instructor, supervising the development of skills (previously introduced by the instructor), administering unsupervised instruction where students have received prior training and only need practice, handling administrative aspects of instruction such as keeping records, recording test scores and administering tests, and supporting the instructor through obtaining equipment, using the equipment in demonstrations, and setting up training exercises, e.g., setting up range exercises.

Lecturer-The lecturer must be able to present highly technical and specialized information. The lecturer should be used to supplement overall staff competencies in technical areas and to provide first-hand experiences to students in the latest techniques of truck driver training and associated job requirements.

Role of Staff

Instructional staff should have the mix of skills to cost efficiently deliver all methods of instruction employed by the training school. The staff should have competencies in classroom, independent study, laboratory, range, and street methods. An Instructor must be capable of and responsible for delivering instruction by utilizing all methods. An Assistant Instructor would be primarily responsible for range and street instructional methods. A Lecturer would be primarily responsible for delivering instructions using classroom and laboratory methods.

Classroom Methods

Staff must be capable of managing classroom learning experiences, including interacting with the adult learner and using instructional aids to their best advantages in accomplishing course objectives.

Independent Study Methods

The staff must be capable of guiding independent study of the students toward the attainment of knowledge objectives that can be efficiently acquired without the particjpation of an instructor. Instructional staff must be able to direct students in a way that recognizes students' individual strengths and weaknesses. This activity requires understanding the abilities and motivations of students to learn as well as establishing the incentives for learning. The staff must be able to communicate to students the importance of independent study and that they will be responsible for learning certain aspects of course content on their own.

Laboratory Methods

Instructors must demonstrate a wide range of truck driver practices (actual vehicle operation, vehicle maintenance, etc.) in such a manner that students will be able to subsequently appreciate the need for performing those tasks. For example, in the area of vehicle inspection, the instructional staff must not only know what to do in an inspection, but be able to perform it correctly while explaining to the students the necessity for the steps and how to perform each step in the inspection. Instructional staff must realize how students learn; by seeing (observing what the instructor does) and by hearing (listening to the instructor's explanations). Students also learn by performing. To conduct laboratory instruction effectively, the instructor must be aware of the contributions of sight, sound and performance in learning.

Range Instruction

Instructional staff must be capable of efficiently setting up and guiding learning experiences in the range environment and must be aware of the total group needs and the needs of individual students. The instructor must

be capable of directing group practice experiences while correcting deficiencies of individual students. The instructor must have command of the skills being taught and be capable of identifying and correcting deficiencies in student performance.

Street Methods

In street lessons, the instructor must be able to communicate the requirements for vehicle handling and safe operating practices in a dynamic traffic world, appraise student proficiency, provide feedback on strengths and weaknesses, and determine the requirements for remedial instruction and practice to achieve proficiency. The on-street instructional method must lead to the attainment of instructional objectives and do so with regard for the safety of students, the instructor, and others using the roadway.

Observer Instruction

In range and street instruction, the instructional staff must be capable of providing instruction to student drivers while effectively dealing with student observers. Instructors must actively involve the student observers in learning by directing their attention to specific aspects of the traffic scene and identifying safe driving practices for coping with the traffic scene. This involvement may be achieved using structured learning activities, such as completion of checklists or other materials designed to enhance the observational experience.

Demonstration Methods

In laboratory, range and street lessons, instructors must be capable of effectively demonstrating all performances that are assigned to the BTW methods (range and street instruction). They must be able to conduct demonstrations by (1) employing safe operating practices and (2) communicating the techniques employed to achieve the vehicle response.

INSTRUCTOR QUALIFICATIONS

A number of instructional staff qualifications are identified in these Standards. The qualifications are listed to ensure that instructors selected possess high levels of driving and teaching ability. The details of instructor qualification factors that must be considered in selection of instructional personnel are first discussed in general terms, which are advisory and not mandatory in nature. This is followed by a summary of the minimum, mandatory qualifications for each type of instructor.

Educational Experience

Instructors should have formal education. However, a school cannot expect to hire instructors with college degrees. More important is the nature of the education they have obtained.

The primary reason for desiring a formal education is to ensure that instructors can employ the methodologies of teaching required by the curriculum. The type of education required is that which enhances ability to teach.

Vocational Education. A background in vocational education is especially appropriate because it aids instructors in

- o managing learning within the environment of tractor-trailer operation.
- o communicating concepts and applying the concepts in actual task performance.
- o working with students to develop skill and ability in performing manipulative tasks.

Other Programs. In addition to vocational education, several other types of education backgrounds lend themselves to particular requirements of tractor-trailer operation. These educational backgrounds include the following:

- o Industrial education--understanding of auto mechanics.
- o Physical education--understanding of psycho-motor skill development.
- o Driver education--understanding of safe motor vehicle operation and development of vehicle handling skills.

Means of Qualifying

Several different education backgrounds can be used to meet instructor qualification requirements. Alternatives range from degrees in education to specialized in-service training programs. The Standards include college instruction, teaching methods instruction, and in-service training.

College-Level Teacher Preparation. A 2 year program in teacher preparation is one method of meeting qualification requirements. The teacher preparation program could be at any level-elementary, junior high, or high school. The degree attained, however, is not of critical importance. Most important is that the 2 years of teacher preparation provide a good exposure to courses in instructional methods, learning theory, curriculum, and other career subjects designed to improve performance as an instructor.

Teaching Methods Instruction. Six semester hours (or the equivalency in quarters and trimesters) of course work in teaching methods is evidence of an appropriate education. The 6 hours of course work must be in teaching methods and could be taken for any level of learner, including elementary, junior high and senior high students, or the adult learner (adult

education). The courses should be specifically in instructional methods and not in other areas of education. The appropriateness of courses can for the most part be determined by examining course titles. Acceptable course titles include the following:

- Educational Methods
- Methods of Instruction
- Methods of Teaching
- Teaching Methods
- Teaching for the Upper Grades
- Teaching for the Lower Grades
- Teaching for the Middle Grades
- Individualized Instruction
- Practicum in Teaching

Background courses may be helpful. They should not, however, replace the basic 6 hour credit requirement. They can be viewed as supplemental and cannot supplant the basic experience gained through courses similar to those listed above. Supplemental courses may be identified by such titles as the following:

- Innovations in Education
- History of Education
- Educational Theory
- Abnormal Psychology
- General Psychology
- Educational Psychology
- Experimental Psychology
- Instructional Design
- Instructional Technology
- Curriculum Development
- Educational Administration
- Issues in Education
- Foundations in Education

Acceptable courses may be taken also from a specific area of study, such as Methods of Teaching Industrial Arts, Methods of Teaching Physical Education, Methods of Teaching the Slow Learner, Methods of Teaching the Adult Learner.

In-Service Training. One hundred hours of in-service instructor preparation in tractor-trailer driver training may be used to fulfill the instructor qualifications requirements. To serve as acceptable substitutes for formal instructor preparation, the in-service training must meet the following conditions:

- The program must occur in tractor-trailer driver training and not other related subject matters such as emergency medical vehicle services, dispatching, fleet management, and fleet operations.
- The in-service experience must be tailored to the teaching of a tractor-trailer driver training curriculum, meeting these Standards.
- The in-service program should be designed to develop instructor skills. Regular in-service programs that are offered for maintenance of instructor skills should not be substituted for the initial 100 hours of specific preparation in instructional methods.

The in-service requirement may be met through several alternatives including (1) selecting individuals for instructors who have already had an opportunity to participate in the in-service program, (2) by training the individual, prior to employment or soon after employment to qualify the person, or (3) having individuals serve as assistant instructors and providing them the 100 hours of in-service training throughout the first several months of employment.

In-service work experience in education programs also may be substituted for the formal educational experience. Teaching experience in vocational education appears to be the most appropriate work education experience to consider in lieu of formal education. Two years of work experience in vocational education provide acceptable evidence of teaching ability.

Driving Experience

The ability to operate a tractor-trailer skillfully and demonstrate safe operating practices is necessary to teach the curriculum. Qualified instructors must not only be able to explain what correct driving consists of but must be able to demonstrate any aspect of driving covered by the course. Some schools prefer to employ the million-mile over-the-road driver. However, while driving experience contributes to teaching, extensive experience is not an essential requirement.

As a minimum, 2 years of tractor-trailer driving experience should be required. The experience should be recent. However, a candidate instructor with 2 years of experience in the last 5 to 7 years should have a sufficient level of operating skill to meet course requirements. This would be especially true if the candidate instructor had gained experience in fleet

management or transportation in the interim. Driving of other trucks should not be used as a substitute for tractor-trailer driving experience.

Driving Record

Instructors must have a good driving record. A good driving record is evidence of one's ability to handle a vehicle and employ safe operating practices. Both of these are critical to instructing students in this course. The driving record may be checked with past employers and through an official records check with the State.

An instructor should have no more than one moving violation within the previous 3 years. While this standard may appear to be high, it is necessary to make up for deficiencies that may exist in current records and for the delay between the committing of an offense and the posting of the offense to the records. A record check of 3 years duration is sufficient. Earlier driving records are not necessarily predictive of present or future driving behavior.

Age

Instructors must meet minimum age requirements for a license as a tractor-trailer driver in the State in which the school operates. Beyond this, there are no fixed age requirements.

Health

Behind-the-wheel instructors must meet the physical requirements for drivers as specified in Part 391 of the Federal Motor Carrier Safety Regulations.

Instructors must have the physical health to provide on-street instruction, conduct range lessons, and conduct demonstrations in the lab. All of these tasks require stamina and in many cases agility. In addition, the curriculum requires a large amount of range and in-cab time in comparison with classroom instruction.

> Range-Unless the range has a control tower, instructors will be on their feet for long periods of time. Further, they must move about frequently to communicate instructions to students, assess student performance, and provide students guidance on performing maneuvers. In addition, they may have to perform these responsibilities under a wide variety of weather conditions. A person must be physically fit to meet range instructional requirements.
>
> On-Street-On-street instruction requires good physical health to handle the strain caused by the simultaneous need to:

(1) instruct the behind-the-wheel operator, (2) monitor student observers, and (3) ensure that the vehicle is operated safely. Owing to the extensive amount of street instruction, an instructor may need to remain in the cab all day.

The curriculum requires instructing students under all possible conditions, including heavy traffic, bad weather, and at night. Instructors must be able to handle the stress in teaching under these conditions. The stress is compounded by working with students who have a wide range of performance capabilities.

The street instructors actually work in a mobile classroom to improve the performance of an individual driver while developing increased understanding of driving practices by student observers in the cab. Imposed on the responsibility of managing a mobile classroom is the need to ensure public safety.

Driving Ability

Driving ability consists of knowledge, skill, and actual performance. The instructor's ability should far exceed ability identified in the objectives of the curriculum; at a minimum, instructors must have a foundation in the knowledges and skills taught by the course. This can be determined by administering the Final Examination Test Battery contained in these Standards.

Candidates may show a lack of understanding of the subject matter (e.g., operation of diesel engines, safe operating practices, diagnosis of malfunctions, etc.) or they may be deficient in specific skills or performances. For example, an over-the-road driver may not be able to perform tight quarter manuevers very well, e.g., backing, docking, etc. Some candidates may not be able to handle skill areas such as skid recovery.

One or two specific areas of weakness would not necessarily rule candidates out as an instructor. However, if they are deficient in several areas, in-service training may be required to bring their ability to an acceptable level.

While instructors should demonstrate mastery of most of the objectives of the curriculum, they should not necessarily be prequalified in specific administrative areas of the curriculum. For example, there is no reason for candidates to have an understanding of the overall unit structure, number of lessons, hourly allocations, or particular schedules employed by the school.

Teaching Ability

Candidates for an instructor position should be able to teach by employing the methods called for in the curriculum. The basic abilities required, ways of assessing these abilities and additional competency that contribute to teaching ability are discussed below.

Required Abilities. The curriculum requires effective utilization of classroom, range, street, observation and demonstration methods. While candidates would not be expected to know specific characteristics of methods employed in lessons of the curriculum, they should have knowledge of the role and function of each. As a minimum, the candidate should have a knowledge of and appreciation for what each method contributes to the student's overall acquisition of the course objectives.

Classroom Method. Classroom instruction provides for the acquisition of the majority of knowledge and attitude objectives. The classroom is where most information is introduced and learned and where students will gain a theoretical and practical understanding of requirements for vehicle handling and safe operation. In addition, classroom instruction provides that information necessary to motivate and permit students to perform maintenance and inspection routines.

To assure effective communication of information, the instructor must be able to make a clear and concise presentation from the lesson plans. Classroom instruction also makes considerable use of problem-solving exercises and instructors are encouraged to interact with students in developing concepts and principles. The ability to conduct highly interactive instruction requires a cordial and patient personality and sufficient depth of understanding to field student questions effectively.

Range. The range provides a protected learning environment where mastery of basic handling skills can be achieved in a cost-effective manner. Candidate instructors should realize that learning can take place other than on a one-to-one basis. Instructors also must be confident in the ability of students to learn without their direct supervision. Instructors would have to know how to efficiently and effectively use an assistant instructor to maintain an efficient range operation. Range instruction is fundamental to the acquisition of skill objectives. It is the method in which most basic operating and handling tasks are mastered and provides underlying skills for safe operating practices on the street.

Street Instruction. This curriculum provides more time for street instruction than for any other method. Street instruction gives students the opportunity to (1) learn and use safe operating practices, (2) demonstrate their ability to interact with the highway traffic environment, and (3) develop proficiency in the various types of driving situations. The purpose of street instruction is not to introduce basic operating or handling skills.

The importance of street instruction time to teach safe operating practices cannot be overemphasized. These practies cannot be learned or demonstrated in any other method of instruction, e.g., classroom or range. Those who are unskilled in teaching, uninformed on safe operating practices, or untutored in analysis of student performance will misuse street instructional time.

Additional Competency

There are a number of other subject areas that are supportive of an instructor's ability to provide effective instruction in a tractor-trailer training curriculum.

Traffic Safety Education-Knowledge of the overall problems and approaches to solving problems through educational methods appropriate for pedestrians, bicycle, passenger car operators, operators of special vehicles (motorcycles).

Traffic Law-Understanding of traffic laws and their relation to safety.

Fleet Management-Understanding of the overall requirements for effective management of fleets.

Fleet Operation-Understanding of the day-to-day requirements, procedures, support systems, etc., for effective fleet operation.

Philosophy of Learning

Two philosophies of learning are detrimental to student attainment of course objectives:

- All learning is achieved by instructors talking and demonstrating.
- The only way of learning is doing, e.g., behind-the-wheel instruction.

Neither a totally teacher-centered nor student-centered philosophy is appropriate to the curriculum. An instructor must understand the roles of each of the instructional methods and the contribution that each of the methods makes to student achievement of the objectives. Students learn by listening and experiencing. Mastery of the fundamental elements of performance must be achieved before any application occurs. The failure of an instructor to understand the roles of each of the instructional methods can result in topics being taught ineffectively or omitted. Candidate instructors should evidence an understanding of all methods even though they may be fully qualified in only one or two methods.

Role of Assistant Instructors

A qualified assistant instructor may assist an instructor by performing the following activities:

- Administer range instruction under the general supervision of an instructor.
- Administer street instruction after students have received prior training and only require practice.

- Administer and score knowledge, range and street tests.

- Handle administrative aspects of instruction including setting up range exercises (e.g., moving cones), and supporting classroom, range and street demonstrations.

An assistant instructor can also conduct classroom lessons when an instructor is in attendance.

Assistant Instructor Qualifications

Under the Instructor Qualification Standards, the qualifications required of assistant instructors are the same as those for instructors with the following exceptions:

Education-Assistant instructors are required to hold a high school diploma.

Experience-Assistant instructors are required to have a minimum of 2 years tractor-trailer driving experience with no more than 2 moving violations in the past 3 years.

The same general requirements concerning driving ability, teaching ability, age, and health, as described for instructors, should be applied to assistant instructors because of the similarity in their assignments. The only area in which requirements might be relaxed concerns the subject matter knowledge and skills required for classroom instruction. As assistant instructors are not permitted to conduct classroom instruction on their own, they need not have the same qualifications as instructors. However, they must at least have the basic abilities demanded by classroom instruction, including articulateness and the ability to interact with students. Subject matter knowledge can be acquired over time.

LECTURER QUALIFICATIONS

As part of an overall instructional staffing pattern, lecturers may be used to aid students' acquisition of course objectives. Schools may employ lecturers to teach specific classroom or laboratory subjects in their particular areas of expertise. They are not permitted to provide range or street instruction. Unlike instructors and assistant instructors, who need credentials as drivers of tractor-trailers and expertise in teaching methodology, lecturers are selected because of their proficiency in highly technical areas that support the trucking industry. As such, lecturers are exempt from the qualification requirements for instructors or assistant instructors. What qualifies a lecturer is his or her specialized knowledge in a technical subject matter area. Schools must not use lecturers as a means of circumventing the requirements imposed on instructors and assistant instructors.

It is not necessary to require lecturers to demonstrate teaching ability or to require educational experience or training if a lecturer will teach a single subject matter area. However, there should be evidence of a

lecturer's capability which can take the form of certificates, licenses, degrees, or job experience. In general, a lecturer should exhibit an attitude toward tractor-trailer driving, the trucking industry and instruction commensurate with the requirements imposed upon other staff.

Sources of Lecturers

Lecturers should be sought in the community where the school is located. Lecturers may be sought from transportation fleets, public agencies, volunteer organizations, vocational schools, and professional organizations.

While most lecturers will be paid consultants, some will be available on a voluntary basis. Public agencies may be willing to provide instruction if it is in line with their objectives. Voluntary services of lecturers are likely to be provided if (1) the time requirement is not excessive, (2) the individual is available, (3) the public agency perceives that by assisting a school, it is meeting its objectives, and (4) the public agency views the school as providing a quality service.

Checking Lecturer Capabilities

Regardless of whether services are paid for or provided on a voluntary basis, it is important that lecturers be competent in the subject they are teaching and capable of meeting lesson objectives. Anyone who is thoroughly competent in a subject should be able to meet the objectives of the course. However, lecturers may be more concerned with telling what they know about the topic rather than communicating to students what students need to know. Activities brought into the classroom that do not help achieve the learning objectives short-change students and, in the long-term, short-change the school owner or operator. The following means should be employed to determine whether lecturers are capable in their speciality areas and capable of assisting in achieving course objectives.

Credentials. Many persons with technical capabilities hold a special certificate or license. While these credentials will not necessarily guarantee they are competent, they will signify whether others in the same area of technical expertise feel they are competent. This is particularly true where the credentials are required by law. Licensing and certificates are not generally issued without a demonstration of competency.

Recommendations. In some instances, lecturers may be able to supply the names of people who can attest to their capabilities, particularly as teachers. This is a helpful check of proficiency and should be used whenever possible.

Professional Activities. Individuals in specialized areas often are affiliated with professional groups. Although their affiliation may be only at the local level, affiliation with one or more groups tends to indicate whether others perceive them as capable. While membership alone is not a

guarantee of capability, involvement may provide some indication of whether individuals are up to date on developments in the profession.

Performance. Observation of performance in an instructional capacity is an indication of compentency. This observation may occur during the course of their regular employment, while they are providing guest lecturer services to some other group/organization, or while they are making presentations to professional groups. A lecturer's performance in front of groups is a good indication of how they will perform in front of a class and of their communication capabilities.

Needs. Before selecting any lecturer solely on the basis of reputation, an interview should be conducted with the lecturer to spell out the school's needs and describe specifically what the lecturer is to accomplish. The lecturer should understand the following: (1) the specific content to be communicated, (2) what it is the students will be required to do, and (3) the level of knowledge that students bring to the class.

Always provide a Lecturer with a copy of the lesson plan to be taught so they will know exactly what is expected of them.

INSTRUCTOR ASSIGNMENT

In assigning instructors and assistant instructors, consideration must be given to the scope of participation in various methods and the number of students assigned to each method. The primary objective is to obtain the best overall performance from instructional staff.

GENERALISTS VS. SPECIALISTS

The most important issue in instructor assignment is whether they will be assigned as specialists (i.e., assigned only to certain methods of instruction), or as generalists (i.e., assigned to all methods of instruction). The final decision in assigning instructors should not be dictated by a predisposition to the use of specialists or generalists but should be guided by the need to use instructional personnel in a way that will secure the best mix of talent for achieving course objectives in a cost-effective manner.

Specialized Assignments

The advantage of specialization is that instructors can be confined to teaching in areas of their greatest strength. For example, instructors with good communication skills could be used primarily in the classroom, while those with good driving skills and a propensity for range instruction could be used primarily in this area. This approach uses the instructors in their recognized strengths and also has the advantage of exposing students to the best available method of instruction.

Because of the technical nature of classroom instruction and the structured nature of in-vehicle instruction, some degree of specialization is needed. Classroom instruction should be assigned to those instructors who know the subject matter extremely well, and can conduct classroom instruction effectively, including presenting information and merging classroom exercises and problems requiring a high degree of student and instructor interaction. In turn, instructors may be able to handle range and street instruction while lacking communication skills needed for classroom instruction.

Specialization should not occur to the extent that teachers in one method of instruction fail to understand what is occurring in the other. Specialization to the extent that an instructor is not knowledgeable of other methods should be avoided for the following reasons:

- Instructors lose appreciation for what is occurring in the other methods of instruction.
- Instructors teaching only one method tend to overteach (teaching all they know, whether needed or not).
- Instructors may unintentionally communicate to students that their method of instruction is more important than another.
- Instructors need some variety in order to overcome routine job boredom.

Generalized Assignments

It is possible to make assignments in such a way that instructors gain the experience to function as generalists. The advantages of assigning staff as generalists include the following:

- It permits greater flexibility in handling overloads of students and distributing the workload more evenly across personnel.
- It enables instructors to track students through the various methods of instruction, thus permitting more accurate assessment of student performance and student record completion.
- It gives instructors firsthand information (as opposed to recorded information) on overall student strengths and weaknesses.
- It tends to encourage instructors to stay more abreast of new ideas in the field of truck driver training.
- Schedules are less likely to be affected by administrative problems such as absenteeism, requirements for individual contact or counseling sessions with students, and company needs for instructors to perform in roles beyond their instructional requirements.

The disadvantage of assigning instructors as generalists is that few instructors are qualified to teach all methods of instruction.

Optimal Assignment Pattern

The optimal pattern of assignment for any school depends upon the capabilities of its staff. Where the staff is broadly qualified, it would be advantageous for the school to use instructors as generalists. However, no matter how broadly qualified they are, all instructors will be better in some areas than others. Their assignments should reflect their strengths.

Regardless of the assignment pattern employed, all instructors must be able to conduct street training. Because of the low student-vehicle ratio involved in street training, there will be times when all students are in vehicles and all instructional personnel must be committed to BTW instruction. Participation in street instruction also gives those instructors who spend most of their time as classroom and range instructors a better perspective of student needs and deficiencies. This experience can be used to enhance instruction for students and to permit modifications to be introduced into range and classroom for future training groups.

In summary, the use of a specialization or generalization staffing pattern largely depends upon the talents available to the school-with the exception that all instructors are aided by and should be involved in street training sessions.

Assistant Instructor Assignments

Assistant instructors are not permitted to teach classroom instruction without supervision. However, within BTW instruction, their time may be divided among range instruction and street instruction. As with instructors, there will be times in which all assistant instructors are needed for on-street instruction to manage the heavy load of students requiring training. Beyond responding to the requirement for street instruction, assistant instructors may be used as specialists or generalists.

The assignment in which specialization would be of greatest advantage is in administration of tests. A high degree of reliability must be achieved in the administration of tests. This can only occur when an assistant instructor is totally familiar with the procedures for test administration and the need for accuracy and objectivity in the administration of the test. One can achieve proficiency in administering tests only through repeated practice.

Lecturer Assignments

Lecturers are selected because of their specialization in a technical area. A lecturer should not be selected in an area in which he or she does not have a high level of technical competency. Training standards prohibit the use of lecturers to teach more than one technical area. Lecturers may only be used for topics in units 4.1, 4.2, 4.3, 5.1, 5.2, 5.4, 5.6 and 5.7.

MINIMUM ALLOWABLE QUALIFICATIONS

INSTRUCTORS

Educational Experience--Each instructor must have a minimum of (1) two years of college-level teacher preparation, or (2) two years of vocational education teaching experience, or (3) six credit hours of teaching methods instruction, or (4) one hundred hours of in-service instructor preparation in tractor-trailer driver training.

Driving Experience--A minimum of two years tractor-trailer driving experience is required with no more than one moving traffic violation* within the previous three years.

Age--The behind-the-wheel (BTW) instructors must meet minimum licensing requirements for tractor-trailer driving in the State in which the school operates.

Health--BTW instructors must meet physical requirements for drivers as specified in Part 391 of the Federal Motor Carrier Safety Regulations.

Knowledge--All instructors must have demonstrated knowledge of the principles and practices of safe driving and of all laws and regulations covering tractor-trailer operation.

Skill--BTW instructors must possess sufficient proficiency in vehicle handling and perceptual skill to administer BTW instruction demonstrations effectively.

ASSISTANT INSTRUCTORS

An Assistant Instructor must possess the same qualifications as described for an Instructor, with the exception of the following:

Education--A high school diploma.

Experience--A minimum of two years' tractor-trailer driving experience with no more than 2 moving traffic violations* within the previous three years.

LECTURERS

Schools may employ guest Lecturers to teach specific classroom or laboratory subjects in their particular areas of competence. Such lecturers are exempt from the requirements for Instructors or Assistant Instructors provided they teach no more than once in every 30 days.

*NOTE: The nature of any moving traffic violations should be given careful consideration. Obviously, failure to stop at an obscured stop sign must be viewed differently than a conviction for operating a commercial vehicle while under the influence of alcohol.

Training Equipment
and Material Standards

TRAINING EQUIPMENT AND MATERIALS STANDARDS

VEHICLE EQUIPMENT REQUIREMENTS

Several tractor and trailer combinations are required to support the curriculum. While most vehicles may be used in their normal configuration, some minor vehicle modifications are required. A listing of vehicle equipment items and modifications is provided in the following paragraphs.

Tractor Requirements

Number of Tractors. The number of tractor-trailers required is dependent upon the number of students to be trained in school at one time, the proportion of their time spent in the vehicle, and the student/vehicle ratio. The number available should provide for a student/vehicle occupancy ratio of three-to-one. This allows one student to drive, the instructor to occupy the passenger seat, and two students to observe. With the in-vehicle time and student/vehicle ratio of the curriculum, a total of four tractors is required for each class of 12 students.

At least one-half of the tractors should be configured for street operation. These vehicles must meet applicable State and Federal requirements for operation on public roadways, including the following:

- State registration.
- Payment of use taxes and other special taxes.
- Inspection requirements.
- Safety and auxiliary requirements.
- Insurance.

The other half of the vehicles may be relegated solely to range training and need not be registered, pay use taxes, or carry the same level of insurance coverage as street-legal vehicles. However, all tractors must be in good mechanical condition and meet minimum safety requirements. All vehicles must be equipped with occupant restraint systems.

Any school that owns only four vehicles (i.e., has only 12 students in school at one time) should configure all vehicles for street operation. If only two vehicles are operated on the street, the need to divide students equally between range and street sessions would create a difficult scheduling problem. However, with multiples of four tractors, one class can work primarily on the range while another works primarily on the street. This would allow half the vehicles to be confined to range use without creating scheduling problems.

Tractor Types. Cab-over-engine and conventional tractors are required to familiarize students with important differences, such as the following:

- o Handling characteristics
- o Turn points
- o Turning radii
- o Front-view perspective

No specific ratio of one type to the other is required as long as students have an opportunity to become familiar with the unique characteristics of each.

Engines. Three engine types are required: diesel (both two- and four-cycle), and gasoline. At least one of each should be available in the fleet. However, no more than one gasoline engine need be provided, regardless of the size of the training fleet. At least one tractor engine should be equipped with an engine brake retarder.

Transmissions. At a minimum, the following transmission configurations should be available for training:

- o Multi-range transmission, e.g., 9-speed, 10-speed, 13-speed.
- o Auxiliary gearbox, e.g., 5-speed main with 2- or 3-speed auxiliary transmission.
- o Multi-speed drive axles, e.g., 5-speed main with 2-speed rear axle.

These transmissions should provide a range of 7 to 13 forward speeds.

Drive Axles. At least one tractor in the fleet should be equipped with a single drive axle and one with a twin-screw (tandem drive) axles.

Suspension Systems. At least one tractor should be equipped with a standard leaf spring suspension system and one with an air cushion suspension.

Street Vehicle Requirements

Vehicles to be used for street instruction have several unique equipment requirements, including sleeper modifications, special displays, communications equipment, and safety equipment.

Sleeper Modifications. The sleeper berth must be modified in the event that more than one student observer is in the berth. This can be accomplished by

installing a bench seat in the sleeper berth. If possible, the sleeper floor should be lowered approximately 6 inches to provide student observers with an improved view of the road. Additional requirements include the following:

- o The seating arrangement must provide student observers with a clear view of the road, the tractor instrument panel, and actions of the driver.
- o The seat must be rigidly secured to the sleeper berth floor and sufficiently padded to prevent injury to the occupants during sudden or unexpected maneuvers.
- o The seating area should be as comfortable as possible to reduce fatigue during long in-vehicle training sessions, and should be adequately ventilated and equipped with side viewing ports to provide student observers with a view of the road.
- o Restraints (at a minimum, seat belts) should be provided for all seating positions and be firmly secured to the floor of the sleeper berth area.
- o Seating accommodations should be designed to facilitate entry and exit by student observers.
- o Where possible, grab bars should be affixed to the sleeper interior to provide a secure handhold for entry and exit.

NOTE: Schools using a one-to-one student/instructor ratio are not required to use modified sleeper-cab type tractors.

Special Displays. A mirror (either portable or fixed) should be attached to the top of the dash panel or some other part of the tractor to permit the instructor to monitor student eye movements. An additional mirror should be attached to the visor over the driver's seat to allow observers to monitor eye movements.

At least one convex mirror should be mounted to the right side mirror bracket to permit the instructor to monitor trailer position during curves and turns. If possible, a separate tachometer should be mounted in view of the instructor's seat position to allow accurate monitoring of student performance during upshifts and downshifts.

At least one tractor in the range training segment of the fleet should be equipped with an air brake pressure application gauge to aid in training students to make smooth, controlled stops.

Safety Equipment. All vehicles involved in over-the-road training will be equipped with those equipment items specified in Part 393 of the Federal Motor Carrier Safety Regulations, including the following:

- o Fire extinguisher
- o Fuses
- o Emergency flares
- o Emergency reflectors
- o Warning flags

Each vehicle shall also be equipped with the following items:

First Aid Kit-Containing equipment sufficient for the treatment of small cuts and lacerations, severe bleeding, minor burns, etc.

Snow Tire Chains

Safety Cables/Chains-For towing of stuck or damaged vehicles.

Vehicle Logbook-Documenting trip length, destinations, maintenance activities, and repair requirements.

Communication Equipment (Optional). Each vehicle should be equipped with a citizen's band (CB) radio, permitting communication on all 40 designated CB channels (or other type two-way radio or radio telephone). It should not be a single-side band (SSB). Radio should be equipped with as long an antenna as possible for maximum range. Extremely short antennas should be avoided as they restrict transmission range to less than three miles under normal conditions. Radios must be licensed.

Range Vehicle Requirements

Equipment requirements for range vehicles are less stringent than those used in street operation.

Safety Equipment. Because vehicles are operating in a confined area, most items of safety equipment need only be kept in the range area rather than on each vehicle. However, each vehicle must be equipped with a fire extinguisher.

Communication Equipment (Optional). All vehicles should be equipped with CB equipment. Since only one-way communication is necessary, receiving units are sufficient. They should be equipped to receive 40 channels.

Skid Equipment (Required only for Optional Lesson in Unit 3.3). Equipment items that may be added to vehicles used in skid control and recovery training include an instructor trolley brake, antijackknife device, a light bar and skid tires.

Instructor Trolley Brake - A separate trolley brake mounted in a position accessible from the right side seat may be used by the instructor to "lock-up" rear tractor or trailer wheels to induce skids. In some

skid recovery programs, the instructor has a brake control that can selectively brake trailer wheels, drive wheels, and front wheels to induce various types of skids. While independent braking systems are advantageous, they are not necessary in conducting skid recovery training. Skids may be induced by having students apply the brakes themselves, the condition that will induce braking skids in normal operation. Since the steering and braking responses required for skillful skid recovery do not depend greatly upon the way the skid has been induced, independent brakes are not a necessity.

Antijackknife Device - Used to control trailer jackknifing during skid training. No specific type of device is required. However, any device should have the following characteristics:

- It should not prevent a jackknife, but only excessive trailer swing and damage to tractor or trailer. The trailer must be free to jackknife for students to learn.
- Actuation of the jackknife limitation device must not require a response on the part of the students that is contrary to what is being learned. (Some devices require that the brake be fully applied--a response that is contrary to skid recovery techniques.)
- The antijackknife mechanism must not influence vehicle handling characteristics in a way that would interfere with instructional requirements.

At present, only fifth wheel devices (i.e., devices that restrict the trailer from striking the tractor's cab) appear to meet these requirements.

Light Bar- A light bar or other flashing beacon should be mounted on the skid pan training vehicle. It should be amber in color and visible in normal daylight from a distance of 500 feet.

Skid Tires - Either treaded or treadless tires may be used on the tractor drive axles and/or trailer rear axles for skid training. Tractor steering axle tires should be treaded and in good condition.

Treadless trailer or tractor drive axle tires have the advantage of allowing skids to occur at relatively low speeds. (Tractors used for skid-pan training should be single drive axle.) Treaded tires on skid vehicles have several advantages, including the following:

- Longer service life thus requiring fewer tire changes.
- Greater safety as treadless tires are likely to "blow out" during skid training.
- Provides the driver with a degree of control similar to most actual skidding situations.

Other Equipment. Other required equipment includes the following:

Tiedowns-Various types of tiedowns for securing trailer loads should be available for instructing students in their installation and adjustment. Included are ropes, cables, chains with slack adjusters and nylon webbing.

Wheel Chocks-For chocking rear trailer wheels.

Tire Changing Equipment-A complete set of tire changing equipment.

Spare Wheel/Tire-Mounted on rim and inflated to proper pressure.

Trailer Requirements

Two types of trailers are required for training:

- o Van trailers
- o Flat bed trailers

Special trailer types are required where specialized training is provided, such as tank trailers, refrigerated trailers or double bottoms.

Trailer Axles. At least one trailer should be equipped with a single axle and at least one equipped with sliding tandem axle.

Trailer Length. Box trailers and flat bed trailers of 40-foot lengths are required for training. Doubles, where used, should be at least 28 feet long.

Trailer Cargo. Sufficient "dummy cargo" should be available with which to load trailers. The most appropriate type of cargo is bales of scrap paper. However, anything of a similar nature is acceptable. Equipment for loading and unloading cargo should also be available.

NOTE: During at least 35 hours of street training required in Unit 2.7, tractor-trailers are required to be loaded to a minimum 15,000 pound payload.

RANGE EQUIPMENT REQUIREMENTS

Effective range instruction requires the use of rodeo type range training exercise markings, communication equipment, and support equipment.

Exercise Markings

A variety of devices may be used to mark paths and points (braking points, turning points) for range exercises. At a minimum, the items below

must be provided. The numbers indicated represent the quantities required to support classes with 12 students and 4 vehicles.

Barricades. Four fixed barricades 4 feet high and 10 feet wide are required. They may be constructed of 1 x 4's or other suitably sized lumber. While barricades may be larger than these minimum dimensions, they should not be smaller. A 10-foot minimum width is required to permit the driver to view both edges of the barricade simultaneously through the left and right rear-view mirrors.

A 4-foot minimum height is required for the barricade to be in view of the mirrors at all times. Barricades shorter in height cannot be viewed in rear-view mirrors under all circumstances.

Stanchions. Twelve stanchions are required. They are used to mark range maneuver boundaries, critical points, turn points, etc. Stanchions may be constructed of 24-inch traffic cones in which a 4-foot dowel, 1 inch in diameter, is inserted. (A height of 4 feet is needed to assure visibility.) A red or orange vinyl flag is attached to the upper end of this dowel. Stanchions constructed in this manner, in addition to being highly visible, are portable and resistant to damage.

Barrels. Three barrels are required at a minimum. Barrels should be 55-gallons in capacity. Barrels should be used as pylons in serpentine range maneuvers where there is a high likelihood that the marker will be struck. To make barrels more visible it is preferable to weld pairs of barrels head to head. These should then be painted "Day-Glow" red or orange for extra visibility.

Traffic Cones. Ten dozen traffic cones, 24 inches high, are needed for constructing stanchions and marking exercise paths.

Curbings. Fifty feet of curbing is desirable for parking exercises because it does not require resetting as do cones. Curbing can consist of railroad ties, portable concrete curbing, or other similar material. It should be a minimum of 8 inches high.

Communication Equipment

To insure both maximum safety and learning, any time that more than one vehicle is operating on the training range, instructors must have a means of clear communication with student drivers. Two-way communication is preferable but not required. Listed below are three optional means of communication.

Walkie-Talkies. Hand-held CB radio units can be provided for each member of the instructional staff to permit direct communication with students from

instructor viewing platform or other areas of the range. These walkie-talkies need not have full 40-channel capability, but should have at least four frequencies to permit more than one instructor to communicate with students.

An instructor responsible for supervising more than one vehicle at a time should communicate with all drivers over the same channel, identifying each vehicle by number, e.g., "vehicle Δ2 stop and wait for vehicle Δ1." This permits the instructor to communicate with any driver in an emergency without having to switch channels. Different instructors would use different channels.

This system will require portable magnetic signs for both doors of each tractor and a smaller sign for the dashboard.

Visual Communications. It is possible to communicate with drivers by means of hand signals. If this approach is used students must be given instruction and drill in the interpretation of hand signals.

If visual communications are to be used, a viewing platform should be erected in a position that will allow instructors to observe students, and vice versa. A platform 8 feet by 8 feet at a minimum of 6 feet high will suffice.

Audible Communications. Audible communications, such as bull horns and whistles, have been used to supervise range instruction. This form of communication is not recommended.

Range Support Equipment

A variety of equipment items beyond those already mentioned are needed to support range instruction. Key items include the following:

Auxiliary Power Unit (Optional)-Or other system which permits jump starting of range vehicles. Dead batteries are a common problem because of the low speeds that characterize range operation. The advantage of a portable system is that other range vehicles used in training are not tied up unnecessarily to jump start vehicles with dead batteries.

Forklift (Optional)-For loading/unloading dummy cargo.

Fire Extinguishers-A minimum of one each CO_2 and dry chemical pressurized fire extinguishers are needed. Dry chemical extinguishers are suitable for extinguishing clothing fires and other fires not associated with mechanical equipment. They should not be used on engine fires because penetration of dry chemical components into internals of engine damages various engine components. CO_2 extinguishers should be used for engine fires only.

Spray Paint-For touching up range exercise markings (see "Range Facilities" under School Facilities section of these standards). At least one can of paint for each color used in the range layout.

Tape Measure-100-foot steel retractable tape for setting cones and measuring range maneuver dimensions.

Numbers-Large numbers should be displayed on the side of the vehicle to permit identification by the instructor. The same number should be placed inside the vehicle. The numbers may be temporarily or permanently affixed. This is not mandatory if range is used by only one vehicle at a time.

MAINTENANCE EQUIPMENT REQUIREMENTS

Support of both street and range instruction vehicles requires supplies and servicing equipment for maintenance of vehicles.

Supplies

The following supplies are needed for maintaining vehicles used in range and street instruction. This is optional if service/repair work is contracted out.

- Lubricating oil and grease for engine lubrication, wheel/axle lubrication, transmission lubrication, transaxle/rear end lubrication.
- Air, oil, fuel, and water filters.
- Headlamps, reflector light bulbs, marker light bulbs, lenses, and common reflectors.
- Battery cables and battery charger.
- Ignition replacement parts for gasoline engines, including spark plugs, condensers, distributor caps, spark plug wires, points, and distributor rotors.
- Engine coolant and antifreeze.
- Spare batteries.
- Mounted tires-A sufficient supply of mounted tires for all tractor and trailer wheels should be maintained.
- Tire gauges for measuring air pressure, tire diameter, tire width, and tread depth.

Servicing Equipment

Owners manuals and ordinary mechanic's tools should be available to permit owner servicing of vehicles (Optional). It is rarely efficient for schools to perform higher level maintenance, such as engine diagnosis and major repairs. For this reason, shop manuals, diagnostic equipment, and specialized tools should be unnecessary.

INSTRUCTIONAL MATERIALS

A variety of instructional materials are required to support instruction. These instructional materials include classroom furniture, instructional aids, and instructional devices.

Furniture

Desks. Each student must be provided with a desk. Desks may be individual, or conference type tables may be used to provide work areas for small groups of students, as long as they provide adequate space for each student. Student desk-chair combinations may be used if large enough to accommodate adults.

Chairs. One chair must be provided for each student. Chairs need not be padded or upholstered for additional comfort as students will infrequently spend more than one or two hours in a classroom session.

Storage Areas (Optional). Cabinets, closets or other suitable areas for storing student workbooks, handouts, and other instructional materials should be provided. Storage areas for students may be integral to student desks or separate. They need not be secured, but should provide a place for students to store materials during the day.

Chalkboards. At least one chalkboard or other suitable surface for instructor notes should be available. It should be at least 4 feet high and 8 feet wide. Smaller chalkboards limit the amount of information the instructor can illustrate. If possible, chalkboards or other devices should be portable or rollaway. This permits the instructor to position the board in the field of view of all students and maneuver the chalkboard to accommodate other instructional materials in the classroom.

Table. At least one table for displaying training models and devices is required. It should be of rollaway type and of sufficient size and height to permit ready viewing of models and instructor demonstrations.

Instructor Platform (Optional). An instructor speaking platform or podium is needed. It should be of sufficient size to permit the instructor to array instructional materials and equipped with a light to permit review of notes and/or comments while viewing movies, slides, etc. It need not be portable but instruction will be facilitated if it is of a rollaway type.

Instructional Aids

The minimum criteria for visual materials and printed materials are listed below.

Visual Materials. Classroom instruction must be supported by appropriate visual materials, including transparencies, slides, slide/cassette presentations, films, videotapes, role displays, traffic boards, etc. Visuals should fulfill the following requirements:

Content-Must be relevant to the objectives of the unit in which the visual is used.

Presentation-Must be highly informational as opposed to entertaining.

Dynamic Media-(e.g., film, videotape) Should be used wherever motion is an essential part of the information to be communicated.

Interaction-Between instructor and student, should be fostered by use of short presentations and visuals that can be created or altered during instruction, e.g., transparencies.

Printed Materials. Each school must provide the printed materials needed for effective instruction, including teacher guides, self-instructional texts and manuals, classroom handouts, reference aids, and checklists. Design of materials must facilitate their effective use and should fulfill the following requirements:

Content-Must be appropriate to intended purpose, e.g., self-instruction, preparation for instruction, use during instruction.

Format-Must fit conditions of use, e.g., in classroom, on range, in-vehicle.

Organization-Should facilitate access to needed information, e.g., use of curriculum sequence, detailed indexing.

Reading Level-Must not exceed the sixth grade reading level.

Optional Aids

The following training aids are optional items, many of which are utilized in the accompanying Model Curriculum for Training Tractor-Trailer Drivers (Curriculum). The Curriculum provides for four types of instructional aids listed below.

Visual Aids. The primary visual aids called for in the Curriculum are transparencies. This type of visual aid has the following advantages in teaching materials used in the Curriculum:

Alteration of Aid-With the use of a grease pencil, instructors can highlight areas of drawings, complete forms, draw diagrams. This facilitates the interactive instruction called for in the curriculum.

Lights-on Instruction-Overhead projections are designed to be used with normal classroom lighting. This further facilitates student-instructor interaction by allowing students to see their materials as well as one another.

Local Reproduction-Transparencies can be made inexpensively from hard copy, which is distributed as part of the curriculum material, rather than as a separate package.

While no slides are provided as part of the Curriculum materials, their use is encouraged, particularly where photographic visuals are advantageous. Prime candidates for photographic slides are (1) traffic scenes, to aid in formulation of defensive driving strategies, (2) potentially hazardous situations, to aid in hazard recognition, (3) vehicle components, to aid in component location and identification, and (4) vehicle defects to aid in vehicle inspection.

Displays. The term "displays" refers to instructional aids that do not require projection and which can remain readily visible. The following displays can be used:

Forms-Large, plastic-coated photographic blowups of printed forms, upon which information can be entered by means of a grease pencil or other means, e.g., driver duty status records (Logs), bill of lading.

Vehicle Characteristics-Photographic reproductions of vehicle cab interiors, components parts, and auxiliary equipment to aid in locating and identifying components.

Reference Information-Data and other technical information to which students must have frequent recourse throughout instruction, e.g., weight limits, range rules, summary checklists.

Traffic Boards-Magnetic or flannel surface diagrams of road configurations upon which model vehicles can be mounted to create various traffic situations.

Audiovisual Aids. Audiovisual aids include films, videotapes, and slide/cassette presentations. No specific audiovisual aids are called for in the Curriculum because of the expense involved.

However, it is recognized that audiovisual aids have the following advantages in teaching tractor-trailer operation:

Motion-Films and videotapes have the ability to show motion, a feature that is valuable when the information content itself is highly dynamic. Useful applications include: (1) portraying traffic situations in "real time"; (2) showing the dynamic forces that operate on the vehicle and driver, e.g., hydroplaning, centrifugal force in a turn; and (3) presenting procedures for carrying out various activities, including vehicle operation and cargo handling.

Uniformity of Presentation-An audiovisual presentation is given in the same way each time. If of high quality it assures that all students get quality, in the same way each and every time.

Range of Information-Beyond their ability to portray motion, audiovisual presentations can communicate a range of information efficiently and in a way that an instructor or static cannot, e.g., on-the-scene reports, first-person presentations, scenarios.

Criteria for Evaluating Aids - A List of Training Aids is provided in the Curriculum. The aids are grouped by the section and unit of the course to which they apply. Listing of these aids does not represent an endorsement or recommendation of their use. Any school contemplating use of any aid listed should obtain a sample on short-term loan or rental basis and evaluate it for its application to the information being presented. A set of criteria for evaluating materials appears below:

Relevance-Is the subject of the presentation relevant to the objectives of the curriculum? Is it relevant to the objectives of the particular unit being taught?

Purpose-Is the purpose of the presentation primarily to present information? Is it primarily to entertain? To frighten? To arouse feelings?

Information-How much of the information in the lesson is included in the presentation? How long does it take to present it?

Accuracy-How accurate is the information provided? Is it current or out of date? Does it correct or perpetuate popular misconceptions?

Timeliness-How current are the situations portrayed? Does the visual portion look dated? Will it detract from the credibility of the information?

Effectiveness-How effectively is information presented? Is the presentation coherent or disjointed? Does it review critical points?

-Quality-What is the overall quality of the production? Does it look and sound professional? Do any flaws detract from the effectiveness of presentation?

Videotape - The availability of low cost videotaping and playback equipment allows schools to prepare their own audiovisual presentations. The unique virtue of videotape is that it can be used over and over, making it suitable for providing students feedback on their performance.

During street instruction, a video camera could be mounted in such a position that the field of view encompasses the scene in front of the tractor-trailer and, if possible, the eye movement mirror mounted on the visor above the driver, the turn signal display on the display console, speedometer and the tachometer. Sound should be recorded to allow a student's commentary to be recorded. Performances that can be monitored include visual search, signaling, speed management, space management, and hazard recognition.

In reviewing the tape, the students will invariably see performance and hazards that they failed to notice when driving.

Instructional Equipment. In the Curriculum, the term "instructional equipment" refers to off-the-shelf equipment used for training purposes. The following items are recommended in administering the curriculum:

Overhead Projector-To project transparencies provided as a part of the curriculum.

Slide Projector-To permit projection of locally prepared slides.

Motion Picture Projector-To make use of commercially produced films.

Video Playback-To display commercially prepared videotapes or those generated during instruction. Video playback should employ either a large monitor (e.g., 24-inch diagonal) or video projector that can be viewed by students in a classroom capable of accommodating 12 students.

Training Devices. The term "training devices" is applied to equipment that is designed to serve a specific instructional need. Instructional devices that are called for in the curriculum, or capable of enhancing instruction, include the following:

- Models
- Feedback devices
- Simulators

Models. The term "models" refers to representations of actual but modified equipment used in training. Models capable of benefiting instruction under the curriculum include: tractor-trailer models, vehicle component models, vehicle parts, and cutaways.

Tractor-Trailer Models - The small tractor-trailer models are useful in providing instruction dealing with the causes of jackknifing, skid recovery techniques and vehicle backing. Inexpensive models can be obtained from toy stores and hobby shops. To be of maximum use in training, models should have the following characteristics:

Articulation-All of the uses of the tractor-trailers mentioned require free articulation of the tractor and trailer.

Steerable Front Wheels-To provide the most effective instruction in backing, the front wheels should be capable of rotation about the vertical axis, either through a steering wheel or by rotating the wheels directly.

Lockable Wheels-To provide instruction in skid control recovery, each set of wheels should be capable of being locked in position. This is best accomplished by drilling a hole through the wheel assembly into the trailer body in which a small pin can be inserted to keep the wheels from turning. In this manner, the pin can easily be inserted and removed. Taping the upper part of the wheel to the vehicle body is acceptable, though more cumbersome.

Vehicle System Models - Instruction in unit 4.1, "Vehicle Systems" can be benefited by providing working models of various vehicle systems, including diesel engines, transmission and power train, air brake systems, and cooling systems. Models capable of operation through either electrical or manual (crank) power are frequently available from hobby shops. They do not have to correspond exactly to the vehicles and components employed by the school so long as they demonstrate the important principles of operation.

Vehicle Components - Various components of the vehicle can be brought to the classroom to demonstrate:

Appearance-At a minimum, components can be used to show students what they look like and as an aid to component identification in instruction concerned with vehicle inspection and servicing.

Operation-Some components can be manipulated mechanically to show how they work, e.g., brake shoes and drums.

Defects-Parts that have failed can be brought into the classroom to illustrate failure symptoms as an aid to instruction in vehicle inspection and component trouble-shooting.

No specific set of components is called for. Almost any available component can and should be profitably used to aid in instruction.

Cutaways - This terms applies to a vehicle component that has been cut open to expose internal parts. Cutaways are used most often to illustrate the internal parts of engines and transmissions. Cutaways for some components are commercially produced, either by manufacturers of the components themselves or by organizations specializing in training devices.

Cutaways have been constructed from old, unservicable components with the aid of an acetylene torch. They have also been constructed out of wood fiber and other construction materials that are easier to work with than steel.

Many cutaways have been designed to permit the movement of internal parts, thus permitting their use in demonstrating component operation. Where parts are not operable, the cutaway can still be used to show the physical arrangement of parts.

Feedback Devices. A number of devices have been designed to furnish students and instructors feedback on various aspects of student performance not available through the instruments with which a tractor or trailer are normally equipped. These feedback devices include: tachographs, accelerometers, fuel flow meters, and brake detonators.

Tachographs - A tachograph is a device that provides a printed record of selected characteristics of vehicle operation. Most commercially available tachographs record engine speed (rpm), road speed (mph), distance and time. Some use a very large scale printout to display the driver's response over relatively short periods of time (minutes, hours) while others use a very small scale and display information for an entire trip. The first type would be most suitable for training, and would allow instructors to examine the coordination of road and engine speed in shifting.

The curriculum does not specifically call for use of tachographs as aids to training because of the ability of instructors to provide immediate feedback by monitoring instruments in the vehicle. Review of tachograph records also takes time. For these reasons, tachographs are not widely used in tractor-trailer training. However, the ability of tachograph records to detect aspects of the driver's control coordination that are not readily apparent during operation, and to review them with students when attention does not have to be shared with control of the vehicle, is advantageous where schools can afford the equipment and the time required.

Accelerometers - Devices designed to measure vehicle accelerations have been widely recommended as an aid in teaching vehicle control. Longitudinal (fore-and-aft) accelerations register the smoothness of the

driver's acceleration, shifting, and braking techniques. Lateral (side-to-side) accelerations measure the driver's ability to adjust speed to rate of turn in curves and intersections. Some accelerometers are designed to give visual readouts, while others give an audible signal whenever acceleration exceeds some predetermined value. No recommendation for or against the use of accelerometers in conducting training can be made.

Fuel Efficiency Displays - Two types of displays have been used to provide feedback to drivers on fuel efficiency of vehicle operation:

> Vacuum Gauges-Devices that measure engine vacuum, indicating the efficiency with which the engine is operating.
>
> Fuel Meters-Devices that measure the rate of fuel consumption, both at the moment and over time. Combined with the odometer, they also give both instantaneous and cummulative readings of mpg.

Of the two types of devices, fuel meters are the most beneficial in teaching fuel efficiency of tractor-trailer operation. Vacuum gauges are intended primarily for use in gasoline powered automobiles and measure only fuel efficiency of acceleration.

Fuel meters can readily demonstrate to students the effect of almost any aspect of driving capable of influencing mpg, including the following:

- Shifting at various road and engine speeds.
- Maintaining momentum by anticipating and adjusting to traffic lights and traffic ahead.
- Idling the engine unnecessarily.
- Avoiding operation at high speeds (e.g., over 55 mph).

Fuel meters can promote energy efficient operation in two ways. First, by showing the effect of various aspects of driving upon fuel efficiency, they can enable drivers to learn what are the most fuel efficient responses, e.g., the optimum engine rpm for shifting. Second, by showing the amount of fuel savings, they can motivate drivers to operate fuel efficiently, e.g., not idling the engine at truck stops.

Brake Detonator - A demonstration of the effect of speed upon stopping distance is called for during the range lesson of unit 2.3, "Speed Management." The demonstration requires the use of a brake detonator, or similar device. A brake detonator is a device that uses chalk and an explosive charge to leave a mark upon the pavement when activated. Two- and three-barrel detonators are available.

With the two-barrel detonator, one charge is fired by the instructor at the moment a "stop" signal is given and the other is fired by the brake pedal at the moment the brake is applied. With the three-barrel

detonator, a third charge is automatically fired by a mercury switch when the vehicle starts to decelerate. The distance between the marks left by first and second charges demonstrate the driver's reaction; the distance between the second and third demonstrates the vehicle's air brake system lag time.

Instruction under the curriculum requires the use of a three-barrel detonator. However, if not available, a pair of two-barrel detonators may be used.

Simulators. In training, the term "simulator" refers to a device that simulates one or more of the tasks that the student will have to perform. They are not intended to simulate equipment, such as tractor-trailers, and do not have to have any physical resemblance to equipment. The simulators that have been widely recommended for use in training tractor-trailer drivers include the following:

- o Highway-traffic simulators
- o Remote control simulators
- o Gearshift simulators
- o Blowout simulators

Highway-Traffic Simulators - The type of simulator most widely used in training drivers is that which simulates the highway-traffic environment to provide drivers instruction and practice in reacting to roadway configurations and the actions of other road users. By far the most frequently used type of highway-traffic simulator is that which uses motion picture film to display the highway-traffic environment. Drivers respond to various aspects of the environment through steering, accelerating, braking, and signaling responses. Almost all the simulation used in driver education is of this type.

Highway traffic simulation has the following advantages:

- o Ability to display situations that would take a long time to encounter in actual operation.
- o Ability to expose drivers to situations that would be too hazardous to create in actual driving.
- o Ability to record responses, in order to permit individual feedback in classes.

The limitation of this type of simulator is that it cannot be used to teach control of the vehicle. While the driver responds to the highway traffic situation, the situation does not respond to the driver, as in normal driving. No matter what the student does, the traffic scene does not change to correspond to the student's action. Therefore, students receive no feedback on the effect that their steering, acceleration and braking responses have upon the vehicle. Motion picture simulators are used largely to teach safe operation practices.

Many believe that the primary value of motion picture simulators lies in the films rather than the expensive hardware used to monitor and record student responses. In view of the limited number of tasks that can be taught through the use of motion picture simulators, and the lack of data substantiating their value in developing necessary knowledges and skills, the use of simulators as a substitute for operation of the tractor-trailer in training cannot be recommended. "Simulator time" cannot be used to reduce required lesson times.

There are available other highway-traffic simulators in which the display representing the environment responds realistically to the student's operation of the vehicle. However, the ability of these simulators to portray highway-traffic environment is very limited and obtaining a realistic vehicle response tends to be expensive. In addition, they tend to create motion sickness because the eyes perceive motion while the body does not. Recent advances in the technology of simulators, permitting motion picture images to respond somewhat to driver control responses, may improve the usefulness of highway-traffic simulators in teaching vehicle operation.

Remote Control Simulators - One of the earliest forms of vehicle simulation is that in which operators control the motion of the vehicle remotely through radio signals. Radio control tractor-trailers have been used for training purposes.

This type of simulator does not really simulate driving tasks because the driver is observing the vehicle rather than the driving scene. This "outside-in" type of simulation is used primarily to teach principles of motion rather than vehicle operation. As principles can be taught as easily by moving model vehicles manually, the radio control feature has little advantage. This type of simulation is not recommended for use with the curriculum.

Gearshift Simulators - Wear and tear put on transmissions by students during the early stages of instruction in shifting has motivated the use of simulators to provide students early practice in shifting techniques.

Gearshift simulators consist of shift levers on which students manipulate and a tachometer and/or speedometer providing feedback on the effects of shifting. On the most sophisticated gearshift simulators, an analogue or digital computer translates the student's manipulation of the shift lever into appropriate rpm and mph readings. Simpler devices are mechanical, consisting of an actual transmission powered by an electric motor.

The advantages of computerized simulation include the ability to simulate (1) the effect of loads upon the drivetrain (e.g., cargo), (2) engine "lugging" when the rpms fall too low, and (3) different types of transmission systems. The primary advantage of mechanical simulators is their low cost, particularly when they are constructed by school personnel from old, unservicable transmissions.

Whether or not gearshift simulators represent a cost-effective way of teaching shifting is a subject of considerable disagreement among school administrators. Those who have them tend to use them. Those who do not have them generally see them as having limited usefulness, either because they believe that it does not provide realistic practice or because they feel they can avoid undue wear and tear on transmissions through good instructional techniques.

No systematic evaluation of the cost-effectiveness of gearshift simulators in developing shifting skills has been performed. However, the availability of a mechanical simulator to provide remedial instruction would allow students having difficulties to overcome them without tying up a training vehicle or damaging its transmission.

Front Wheel Blowout Simulator - A blowout simulator does not so much simulate a blowout as it does to create one. It consists of a modified wheel rim that allows the instructor to exhaust air from the tire rapidly by activating a device inside the cab. The tire then can be quickly reinflated from an air tank carried on the vehicle. In a tractor- trailer driver training program, the rim would be placed on one of the front wheels because front wheel blowouts are of concern.

The effectiveness of training with the blowout simulator has not yet been determined. Cost-effectiveness is not a consideration as there is no other way to provide such training. Since the response to a front wheel blowout is not in itself complicated-holding the wheel firmly and staying off the brake-the primary value of a simulator is in permitting students to experience a blowout to (1) impress upon them the need for maintaining a firm grip on the wheel at all times, and (2) give them confidence in their ability to maintain control over the vehicle. Bearing the expense of a simulator to attain this limited objective is therefore not required.

SCHOOL FACILITIES STANDARDS

This section of the Standards pertains to four types of facilities:

- o Range facilities
- o Vehicle service facilities
- o Classroom facilities
- o Street training routes

RANGE FACILITIES

A driving range for teaching basic vehicle control (Units 1.4 through 1.8) is optional; but it is the only practical way to operate a training course involving more than one or two students. The only alternative to a range is a seldom used side or dead-end street where traffic can be blocked off or controlled adequately to provide a safe, protected area for student practice.

The following covers dimensions, surface markings and structures appropriate for a range facilitiy.

Dimensions

The size of the range will depend upon the nature of the exercises to be carried out.

Single Range. To carry out all the learning activities within the curriculum, including skid pan training, would require a range facility with a minimum paved area 900 feet by 150 feet. Most important is providing a margin of safety around the perimeter of the maneuver area (approximately 25-50 feet where space permits) in case a vehicle leaves the exercise area. Also, a sufficient acceleration approach lane and a sufficient deceleration run-out area must be allowed. The length of the acceleration and deceleration area would depend upon the speed that the test vehicle is required to achieve for each particular exercise (these are particularly important in setting up a skid pan). These distances must be checked carefully. The instructor should run each maneuver with the training vehicle(s) to ensure proper set up and to determine any limitation of the maneuver, vehicle or dimensions of the area involved.

Multiple Facilities. It is not necessary to have or to use a single range area. A school may use a small area (e.g., school yard, parking lot, or street in front of a school) approximately 300 feet by 100 feet to conduct the initial lessons in putting a vehicle in motion. Using space available to the school in the form of a yard or vacant lot, parking area, adjacent street, etc., allows schools without range facilities to conduct initial range exercises at their convenience, at a minimal cost and without taking students into traffic before they are ready.

If the larger facility needed for the bulk of the range exercises has to be rented, using space available to the school as mentioned above will

reduce total rental cost and would also allow use of a range facility that might not be available on an everyday basis. Range areas suitable for temporary use can be found in commercial or municipal parking lots, schools, national guard armories, military posts or unused air strips.

An area 500 feet by 150 feet would be sufficient to conduct all necessary range exercises in the curriculum with the exception of the skid pan. An area 300 feet by 150 feet is a recommended minimum area for a skid pan with an in line approach lane 600 feet long for acceleration.

Surface

The surface of the range must be capable of supporting the weight of an unloaded tractor-trailer. It must be flat, free of dips or bumps, and have a sufficient grade to allow water to run off the surface. A one-percent grade is ideal.

Basic Surface. Many schools start with unpaved areas surfaced with crushed gravel and pave them later. The weight of the tractor-trailers compresses the crushed gravel, allowing it to serve as an acceptable base. Ultimately, the driving area must be constructed of high quality paving material, such as asphalt or concrete, if it is to be used for all of the curriculum units. It is desirable to spread a very light coating of clean, light sand over the surface, particularly at places where the vehicle will turn, to reduce friction when trailer tires scrub the pavement. On very hot days, it may be desirable to wet the surface to reduce heat and lubricate the surface to prevent it from being gouged as the trailer wheels scrub it.

Low Friction Surface. For skid pan training it is necessary to minimize the friction of the range surface as much as possible. The lower the friction, the slower the vehicle speeds required to teach vehicle skid control, thus providing a safer and less expensive site. To achieve the desired low friction surface, the skid pan area must be coated or sealed with a low friction substance. Four types of low friction substances are discussed below.

Coal Tar Emulsion Sealer - Many different brands are available. The type used to seal driveways, such as "Jennite," is ideal. Several coats should be applied to the surface. While the sealer can be applied with specialized machinery, hand application with a squeegee will also ensure a smooth finish. It is generally available in 5-gallon tins and 55-gallon drums. One coat should be applied in one direction and allowed to dry, then a second applied at right angles, e.g., coat one applied east to west, and coat two north to south.

A water source is essential. Therefore, unless there is convenient access to a nearby hydrant, a water line must be provided. A fire hose and spray nozzle should be used to keep the pan wet enough that reflections can be seen in the water. Note that the entire skid pan should not be wet-only the maneuvers area. If the entire pan were wet, a skidding vehicle could continue to slide off the pan and injure someone

or be damaged itself. The skid pan should be designed so that runoff water does not wet the acceleration line.

Soap Flakes - Commercially marketed soap flakes used in service stations to clean service bays provide an inexpensive way to create a low friction surface. The flakes can be used on any aggregate surface and do not require a constant flow of water. They are large, usually the size of silver dollars, and generally come in 50-pound bags or 55-gallon drums. The maneuvers area of the skid pan needs to be wet before the flakes are applied. They should be spread evenly over the wet surface and the maneuvers area should be then wet down again to attain proper surface condition. The problem with this method is the difficulty in keeping all areas uniformly slippery and/or the need to reapply water because of evaporation.

Oil Surfaces - Many schools have spread oil over an asphalt surface to obtain a coefficient of friction that is lower than that afforded by water. The reduced coefficient of friction allows skid control and recovery maneuvers to be performed at speeds that are substantially lower than those required on a wet surface. The lowered speeds, in turn, permit the dimensions of the skid pan to be greatly reduced. Skid training of automobile drivers has been given in areas as small as 100 by 100 feet. This not only limits the size of the real estate investment required, but permits training to take place near schools that do not have enough land available for a large skid pan.

Offsetting the reduced dimensions is the mess created by the oil. Vehicle exterior and underside must be cleaned frequently, and the oil is tracked into other areas.

The second problem is the need for a recirculation system. Because of the cost of oil and the difficulty of legal disposal, a system of recirculating the oil must be built into the range. This not only increases costs but limits the size of the range area. The cost of equipping an area large enough to accommodate tractor-trailers would be extremely great and possibly prohibitive.

Finally, oil complicates aspects of range training such as placing and resetting traffic cones and maintaining a dry buffer zone around the skid pan area.

Water Soluble Polymers - Polymers can be mixed with water to create extremely low coefficients of friction. One polymer is Union Carbide's "Polyox Resin." The substance is completely non-toxic and biodegradable. When mixed with water and spread over concrete or asphalt areas, it reduces friction to approximately 20 percent of that of water. Being water soluble, it can be washed off a range area following its use without any environmental problems and returns the range to its original coefficient of friction. Although no recommendation concerning its use can be made, informal tests indicate the product has great promise towards converting any paved surface into a skid pan rapidly and inexpensively.

Surface Markings. For maximum flexibility in conducting range exercises, it is recommended that permanent delineations not be provided, e.g., curbs, grass or painted lines. No matter how certain or complete a range layout may seem, changes are inevitable. When permanent delineations are used to make a range, a school drastically reduces its flexibility and may result in costing the school valuable time and money and much inconvenience. The following items can be used in setting up range exercises on a temporary basis:

Movable traffic cones or flags-Locations of cones may be marked with spray paint. Different colors may be used to indicate cone locations for various exercises. Marking cone locations expedites the setting up of exercises, and allows students to be used as helpers. Recommended size of cones or flags is 12 to 18 inches.

Portable barricades and curbing-It is recommended that barricades be at least 10 feet long and 4 feet high. By installing rollers on the barricades, transporting them to and from storage and from exercise to exercise becomes much easier.

Metal, plastic or fiberglass drums-Drums are usually seen more easily than cones or flags by the student, especially if painted a bright color, e.g., orange or red. They are better for marking actual areas than cones or flags.

Movable objects have the following advantages over permanent delineations:

- They provide only one set of markings for each exercise.
- They permit exercises to be changed if the first exercise proves inadequate.
- They allow locations of exercises to be moved periodically to minimize wear on the range.

Structures

The range should be as free of structures as possible to avoid limiting range activities and to minimize the chances of collision. The following structures are recommended, not mandatory.

Lighting-If night classes are conducted, poles should be placed around the perimeter of the range. Every effort should be made to avoid placing them within the range area.

Fencing-The off-street area should be enclosed by a fence or other barrier to prevent access by the public during range operations.

Enclosures-Some form of shelter (e.g., shed, movable trailer, etc.) should be present to store equipment. It should be completely enclosed to minimize the chances of theft or vandalism. Nighttime illumination also provides a form of security.

VEHICLE SERVICE FACILITIES

Schools should have the necessary facilities for routine maintenance.

At a minimum, this should include a sheltered garage area sufficient to permit servicing of tractors in all weather.

Service facilities should provide access to the vehicle from underneath. This may be either a pit or a lift. The advantages of a pit are

- o easier servicing of most vehicle components.
- o lower cost.
- o ability for students to examine underside of vehicle without disruption.

NOTE: This is optional if service/repair work is contracted out.

CLASSROOM FACILITIES

While the curriculum imposes no unique requirements for classroom facilities in terms of either size or configuration, facilities should be sufficient to accommodate the recommended number of students (12). In selecting classroom facilities, consideration should be given to a number of factors which can influence the overall quality of instruction, instructor-student interaction, and classroom comfort. The more important of these are

- o arrangement of classroom furniture.
- o classroom lighting.
- o classroom ventilation/temperature.
- o storage.
- o instructor workspace.

Arrangement of Furniture

The arrangement of classroom furniture can have a substantial impact on student learning. Student desks should be arranged so that all students have a clear view of the instructor and any visual aids the instructor might employ. Student interaction is facilitated if seating is arranged so students can see one another, although not a requirement.

Even though the curriculum does not specifically require the use of films or other visual aids, a center aisle of sufficient width to permit the unobstructed operation of projectors should be maintained if visual aids are used.

Classroom Lighting

General overhead lighting, either incandescent or flourescent, is sufficient for all classroom training activities. Flourescent is preferred because of its low heat and nonglare properties. Student or instructor desk lamps are not required. Illumination level should be of sufficient intensity to permit reading of student materials and notetaking.

If visual aids other than overhead viewgraphs are employed in instruction, some provision should be made for dimming lights by either

- o multiple switches controlling groups of lights.
- o variable brightness light switches.

Should the classroom be equipped with windows, blinds or curtains will be necessary for blocking light when visual aids other than overheads are used in instruction.

Ventilation/Temperature Control

Student and instructor comfort during training will be improved with adequate ventilation and temperature control. While facilities need not be air conditioned in most climates, provisions for ventilating classrooms with fresh air must be provided. Where training is conducted in winter months, classrooms must be heated.

Storage of Materials (Optional)

If possible, storage space accessible from the classroom should be made available for storing

- o student materials.
- o training aids.
- o reference materials.

Student Materials. Student materials used during classroom instruction, such as test forms, student workbooks, etc., should be stored to lend easy access by instructors. The storage of these materials in the classroom (or in an area adjacent to the classroom) can increase the efficiency of instruction and minimize time lost. The storage need not be secure and could consist of no more than a set of shelves sufficient to store supplies necessary for a single class. Materials can then be restocked as needed from general supplies for each new class.

Training Aids. Training aids and training equipment, such as mock-ups, cutaways, models, etc., should be stored in a central area easily accessible from the classroom (if not stored in the classrooms). Storage should be arranged so that the instructor has ready access to these aids and equipment throughout classroom instruction.

Reference Materials. If reference materials are provided for student and/or instructor use, they should be stored in an area accessible at all times during the training day by both students and instructors. Examples of reference materials include trucking industry magazines, professional journals, and reference texts. This storage space need not be extensive or necessarily secure; it should allow students and instructors easy access to the use of these materials.

Instructor Workspace (Optional)

It is desirable that a separate instructor workspace be provided. Any space provided should include at least one desk and an equipment locker for storing instructor equipment used during training.

This space may be shared. There is no requirement to provide separate space for individual instructors, individual desks or equipment lockers. The space should be sufficient to permit a number of instructors to use it at the same time. It can be used also by instructors to work with students on an individual basis.

Instructor workspace should be accessible but not within the classroom. It should also be accessible without entering the classroom. This permits instructors not involved in classroom training access to the workspace without interrupting classes.

STREET TRAINING ROUTES

Street training routes must represent the broadest possible range of characteristics with respect to the following items:

Number of Lanes-two-lane, multi-lane.

Setting-urban, suburban, rural.

Configuration-straight, curved, ramps.

Grade-steep, gradual (long), uphill, downhill.

Structures-bridges, tunnels, railroad crossings.

Density-open, bumper-to-bumper.

Access-unlimited, limited (freeway).

Special Zones-hospital and school zones; industrial and commercial zones, and truck routes.

Basic road skills (unit 1.8) should be taught on roads with an absolute minimum amount of traffic. It is essential that these routes be as uncomplicated (i.e., no tight turns, difficult intersections, etc.) as possible. When students become more proficient, two lane roads with steep hills and curves should be used to introduce the necessity of gear shifting. Thereafter, routes should gradually go through larger towns and cities. Freeways or expressways, bridges, tunnels, railroad grade crossings and other "special requirement" driving situations must be worked into these routes as much as possible within the limits placed upon the school by its geographic location. Schools that are located in rural areas will have to incorporate more extensive practice road trips into their curriculum to reach areas where these conditions exist. The intent is to give students full exposure and practice in such situations. During the final stages of training, heavy use of routes in urban traffic, including trips into central business districts and commercial areas (factories, piers, and warehouses) are necessary to give the student full exposure to maneuvering skill and resulting stresses.

Every effort should be made to lay out as many routes as possible to avoid having students covering the same areas so many times that they become memorized, thereby eliminating the challenge posed by exposure to new situations.

STUDENT/INSTRUCTOR RATIO STANDARDS

This section of the Standards pertains to allowable ratios of students to instructors during training in four modes: Classroom, Lab, Range, and Street. First, the recommended ratios are given. This is followed by the maximum, mandatory standards for student/instructor ratios.

RECOMMENDED STUDENT/INSTRUCTOR RATIOS

The recommended ratios are as follows:

- Classroom -- 12 to 1
- Lab -- variable
- Basic Range -- 6 to 1
- Advanced Range -- 12 to 1
- Street Instruction -- 3 to 1

Classroom

While the Standards permit a ratio as high as 24:1, a 12:1 ratio is recommended for the curriculum. This ratio is recommended on the basis of interaction, aids and integration of modes.

Interaction. The curriculum requires a highly interactive form of classroom instruction. Interaction is required between student and instructor and between students in a number of the classroom exercises. A ratio of 24:1 or greater is entirely appropriate for lecture presentations. However, interaction is difficult to maintain with more than 12 students at a time.

Use of Aids. Classroom instruction in the curriculum relies heavily on the use of aids, visual aids, and other types of equipment and devices. The use of aids, especially the use of models and vehicle parts, requires students to be near the aid to observe what the instructor is trying to communicate. To observe and gain communication from the aid, class size must be reasonably small. For example, it is not likely that 24 students clustered around a model of a brake drum could see what the instructor was pointing out.

Integration of Modes. Effective learning requires close integration of classroom and BTW instruction. Information presented in the classroom should be implemented as soon as possible in order that students will not forget the information and have to be reinstructed. Achieving integration requires scheduling lab, range, and street instruction as soon as possible after classroom instruction.

The higher the classroom student/instructor ratio, the more difficult it is to achieve integration. For example, in a 24:1 classroom student/instructor ratio, the 24 students would be ready to take the corresponding street lesson upon completion of a classroom lesson. Given the 3:1 student/instructor ratio for street instruction, eight instructors would have to be available to accommodate students. Few schools have such large numbers of instructors to handle a single class of students. The alternative is to conduct the street lessons in sequence, thereby creating a gap between classroom and street instruction.

A 12:1 student/instructor ratio allows a group of students leaving classroom instruction to be handled by only four street instructors. While providing for an effective integration of class and BTW instruction, a 12:1 ratio would work a hardship on a few schools since most enroll no more than 12 students at a time. Where schools enroll more than 12 students, larger groups could be divided into two classroom segments without great difficulty as classroom instruction is the most inexpensive method of instruction employed in the curriculum.

Basic Range

Range instruction as specified in Units 1.4 through 1.8 of the Curriculum are referred to as "Basic Range" and specify different student/instructor and vehicle/instructor ratios than the "Advanced Range."

Student/Instructor Ratio. For range instruction, the student/instructor ratio is a product of

- o student/vehicle ratio-the number of students per vehicle.
- o vehicle/instructor ratio-the number of vehicles the instructor will supervise.

The student behind the wheel is the one primarily receiving instruction, therefore the vehicle/instructor ratio is far more important than the student/instructor ratio. Although the Standards permit no more than a 3:1 vehicle/instructor ratio, they also permit an assistant instructor and an instructor to collectively supervise four vehicles. This means a vehicle/ instructor ratio of 2:1, with two vehicles operating under the direct supervision of an assistant instructor and two more operating under the direct supervision of the instructor. It is the latter 2:1 ratio that is employed in the curriculum. The 2:1 vehicle/instructor ratio allows closer supervision than a 3:1 ratio.

With a 3:1 student/vehicle ratio and 2:1 vehicle/instructor ratio, the student/instructor ratio is 6:1, i.e., six students for the assistant instructor and six for the instructor. Four students would be receiving instruction and/or practicing behind-the-wheel simultaneously, while two additional students per vehicle, would be observing and awaiting their turn at the wheel.

Student Observers. The students in the tractor-trailer observing the driver, or observing the vehicle from the range, obviously are not receiving the same amount of instruction as the student driver is. However, as long as they are observing, they are learning the following:

> Exercise Procedures-Observing the way in which an exercise is performed reduces the time it takes to acquaint observers with the exercise when they become drivers.
>
> Driver Performance-By observing the correct and incorrect performance of the driver, requiring them to record that performance and by participating in the critique (primarily listening to the instructor) each time the driver finishes at the wheel, they can improve their own performance during their turn BTW.

It is on the basis of learning through observation that the Standards permit the number of BTW hours of range instruction to be offset by observation time.

Exceptions - There are two exceptions to the vehicle/instructor ratios that generally prevail in basic range instruction. The first applies to Unit 1.4, "Starting the Engine and Putting the Vehicle in Motion." In these exercises, it is required that a 1:1 vehicle/instructor and 1:1 student/instructor ratio be used. The basis for this 1:1 ratio is the need to provide a margin of safety for students who may be nervous or excited over their first experience in starting and moving a tractor-trailer.

The second exception involves Unit 1.8, "Proficiency Development." During the last third of Lesson 2, the vehicle/ instructor ratio may be raised to a 4:1 ratio. Thus, during the last 12 hours of that lesson, a 12:1 student/instructor ratio is permissable. This higher ratio is, however, contingent upon the students having met all prior unit objectives and the availability of a range of sufficient size to support the operation of four vehicles simultaneously. In addition, a communication system would be required so that instructors could provide instruction and general traffic control without making direct face-to-face contact with the student drivers.

Instructor responsibility during range instruction includes the following:

- Supervising the setup of range exercises, including the placement of barricades, etc.
- Explaining and demonstrating maneuvers to be performed.
- Explaining and demonstrating the driving techniques to be used.
- Observing and critiquing driver performance for drivers and observers.
- Exercising general traffic control to prevent vehicles from endangering one another.

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Advanced Range

Range instruction as specified in Units 2.3, 2.5, 2.6, 3.2 and 3.3 of the Curriculum are referred to as "Advanced Range" and specify different ratios than the "Basic Range."

Student/Instructor Ratio. Instruction in the "Advanced Range" units requires a 1:1 vehicle/instructor ratio, because of the potential hazards in performing the required exercises without close supervision of student drivers. To reduce operating costs, as 12:1 student/instructor ratio has been recommended. The basis for this ratio is the required limit of one student in the vehicle at a time, always accompanied by an instructor (except for a portion of Unit 2.5 "Night Operation"). This leaves 11 students in an observer status outside the vehicle. The reasons for keeping student observers outside the vehicle are (1) the sometimes severe motions that the vehicle will experience during certain maneuvers, and (2) observers can see far more of what is happening from outside the vehicle. It should be noted that the 12:1 ratio is only recommended and any school that can provide a lower ratio is urged to do so, to improve quality of training.

Student Observers. To avoid wasting time, student observers must be learning from their observation. This shall be accomplished by providing them with a "running commentary" as each vehicle maneuvers through an exercise. This is done by having observers standing beside a radio receiver, at a safe distance from the maneuvering area. The radio receiver must be capable of picking up all communications between instructor and student within the vehicle on the range. Additionally, the instructor provides comments upon what is happening and why, for the observers. This instruction can be enhanced by having an assistant instructor positioned with the observers to provide them with more elaborate instruction than merely listening to the broadcast comments. Use of an assistant instructor provides an additional benefit, because the instructor in the range vehicle can reduce the amount of comments necessary (to aid the observing students) and thus concentrate more fully on instructing the student driver.

Since only one vehicle can safely execute an Advanced Range maneuver at any one time, the number of vehicles is necessarily limited, regardless of range size. Up to 4 vehicles may be utilized, with 3 vehicles returning from or getting set up for a maneuver. With more than 4 vehicles, too much time is spent in waiting to perform a maneuver.

Instructor responsibility during Advanced Range instruction includes everything required in Basic Range instruction, plus the following:

- Instructors always ride with the student driver for safety reasons.
- Instructors regulate entrance and exit from maneuvering areas to prevent more than one vehicle being on range at a time.
- Instructors strictly regulate vehicle speed at all time.

- Instructors provide both instruction and immediate feedback to student drivers on their performance.

Street Instruction

While the Standards permit other ratios, the Curriculum is based on a 3:1 student/instructor ratio for street instruction. This ratio is recommended as the safest, most cost efficient ratio, consistent with maximum student learning. With the 3:1 student/instructor ratio, an instructor occupies the right front seat, one student is behind the wheel and two students are in the sleeper berth area (as observers) at all times. The vehicle pulls out of traffic periodically to allow students to be rotated from observer to driver positions.

Because the instructor is in the vehicle, a 1:1 vehicle/instructor ratio prevails in street instruction. For there to be a true 3:1 student/instructor ratio, observers must be actively engaged in instruction. Under the Curriculum, the participation of observers in the learning process is maintained by requiring them to observe and record driver performance, and to participate in a critique each time a driver finishes at the wheel.

Exceptions - Student/instructor ratios of 1:1, 2:1 and 4:1 may be used instead of the recommended 3:1 ratio. Minimum requirements for use of these alternative ratios may be found under "Minimum Driving Requirement" and "Time Waivers and Optional Lesson Requirements" sections of the General Curriculum Standards.

Instructor/vehicle ratio of 1:1 may be dropped during the final 10 hours of Unit 2.7, provided all conditions as specified in Curriculum Unit Standard 2.7 have been met.

Instructor responsibility during street instruction includes the following:

- Directing the driver around the training routes.
- Regulating frequency and duration of student's turns behind the wheel.
- Observing and critiquing driver performance.
- Making sure that student observers are learning by observing, recording and critiquing the driver's performance.
- Providing demonstrations of specific safe and fuel efficient operating practices.
- Providing an oral commentary during driving demonstrations where necessary to reveal instructor response.

- Handling questions raised by students as various road and traffic situations arise.

- Exercising sufficient supervision and control of the student driver to assure their safety and that of other road users.

MAXIMUM ALLOWABLE STUDENT/INSTRUCTOR RATIOS

Schools shall not exceed the following student/instructor ratios during training:

Classroom--One instructor for each group of 24 students, except for Unit 1.1 "Orientation," where larger numbers may be assembled.

Lab--This varies, see individual lesson plan requirements.

Basic Range--One instructor or assistant instructor for each group of three vehicles being operated, with a maximum of three students per vehicle. These requirements may be waived for Unit 1.8, provided students have demonstrated sufficient competence in vehicle handling to assure that they pose no danger to themselves or other students. One qualified instructor must, however, exercise overall supervision of the range during instruction or practice.

Advanced Range--A 1:1 vehicle/instructor ratio, with a maximum 12:1 student/instructor ratio. A limit of one student in the vehicle (with instructor) at any time, except in Unit 2.5.

Street--One instructor or assistant instructor for each vehicle, with no more than four students per vehicle. The requirement for one instructor per vehicle during street instruction may be waived in unit 2.7 under the following conditions (where State laws permit):

- Students have demonstrated sufficient vehicle handling skill and knowledge of safe-driving practices to assure the safety of the public.

- An observer critique of student drivers is employed and reviewed by an instructor to assure quality and level of student activity.

- No more than two students per vehicle, one driving and one observing.

- Vehicles have two-way radios which can reach the school office in case of emergencies.

STUDENT ENROLLMENT STANDARDS

This section of the Standards pertains to five minimum student enrollment requirements:

- o Age
- o Physical requirements
- o Driving ability
- o Driving record
- o Student selection process

STUDENT SELECTION

This section will examine the qualifications that are important to successful completion of the curriculum and the processes by which student qualifications can be assessed and evaluated. It should be noted that minimum requirements and recommendations are frequently mentioned within the same subject. Therefore, this section should be read carefully to determine the minimum applicable standards.

QUALIFICATIONS

There are a number of characteristics that strongly influence an individual's ability to successfully complete tractor-trailer driver training. The qualifications to be addressed in this section include the following:

- o Age
- o Physical requirements
- o Driving ability
- o Driving record

Age

At a minimum, a student should be old enough to be able to operate a vehicle upon completion of graduation. In some States, the age is 18; in others it is 21. To be certified to drive in interstate and/or foreign commerce, Part 391 of the Federal Motor Carrier Safety Regulations (FMCSR) requires that a driver be at least 21 years of age.

Physical Requirements

Students who wish to operate a tractor-trailer should meet the physical requirements established in Part 391 of the FMCSR. These requirements include vision, hearing, physical impairments such as a loss of limb, diseases and respiratory conditions which could interfere with safe vehicle operation (e.g., coronary disease, epilepsy, psychiatric disorders, etc.) and alcohol or drug use.

In addition to meeting all of the physical qualifications, students must be able to read, write and speak English.

Drivers who cannot meet Federal or State physical requirements for certification must be apprised of their limitation and its likely effect upon their career potential. If there is any doubt about a student's ability to meet physical requirements, the student should be encouraged to have a physical examination and obtain a completed report from the physician. It is recommended that all prospective students be given a copy of the minimum physical examination contained in the FMCSR and told to check with their personal physician to make sure they qualify prior to enrollment.

Driving Ability

A tractor-trailer is not the appropriate place in which to learn to operate a motor vehicle. All applicants should have a valid driver's license and at least one year (four seasons) of automobile driving experience before being accepted as a student into a course predicated on these Standards as the Standards were developed on the assumption that entering students will already have had one year of automobile driving experience. For this reason some of the subjects taught in basic driver education are not covered in the Curriculum.

Applicants who have a license for automobiles, but whose ability is suspect, should be taken for a test drive to ensure that they have the manipulative ability to control a vehicle and the information processing ability to be able to cope with heavy traffic conditions. Applicants who lack the ability to drive an automobile must be told to wait until they have gained one full year (four seasons) of driving experience before enrolling in the course.

Driving Record

Students in tractor-trailer driving programs tend to come from that age segment of the population most represented in accidents and traffic violations. One or two accidents or violations is not a bar to success in finding a job as a professional tractor-trailer driver, particularly if the driving record is clear over the past 3 years. However, a long record of violations is likely to disqualify a driver from a position with a motor carrier. A driver whose record includes one or more of the following offenses may be disqualified from interstate operation under Part 391, the FMCSR:

- o License suspension or revocation.
- o A conviction for alcohol or drug-related offense.
- o Leaving the scene of an accident involving injury or death.
- o A crime involving a felony or transportation of drugs.

SELECTION PROCESS

The process by which students are enrolled in a tractor-trailer driver course should include (1) submission of an application form, (2) a personal interview (optional), and (3) testing (optional) as an aid to potential students.

Application Form

Each school should have available an application form calling for, at a minimum, the following information:

- o Name
- o Date of birth
- o Home address and telephone number
- o Name, address, and telephone number of individual to be notified in case of accident or illness
- o Present occupation
- o Driver license number
- o Age
- o Year driver's license first issued
- o Expiration date of current license
- o Number of miles driven last year, by vehicle type
- o Types of vehicles licensed to operate
- o Accidents and violations over the past 3 years
  - Brief description of accident
  - Violation for which convicted
- o License suspension/revocation in the past 3 years

Interview (Optional)

Individuals whose application forms reveal no obstacle to successful completion of the course should be interviewed by a representative of the school's administrative staff. The interview should be straightforward and include a discussion necessary for the prospective student and the administrator to make an intelligent decision concerning enrollment in a tractor-trailer driver training course. This information exchanged during the interview should include the following:

Information About The Course-The nature of the course, the time commitment required, and financial arrangements involved should be candidly presented.

Background Information-Information about the applicant's background not contained on the application blank should be obtained, including employment history, criminal record, credit record, and health.

Observation-The interview provides an opportunity for the administrator to look for characteristics related to employability, including physical health.

Instructional and Employment Prospects-The administrator should provide a frank appraisal of the applicant's likelihood of completing training successfully and obtaining the position sought.

While this process is optional, it is recommended for the benefit of the school and the prospective student.

Testing (Optional)

After completing the interview, applicants who are judged suitable for enrolling in a tractor-trailer driver training course should be subjected to limited testing to verify their ability to handle instruction. Brief tests of ability (e.g., reading and arithmetic) should be administered to screen those who are not up to the demands of the course. It must be stressed that this is optional.

The best known source of information on available tests is the Eighth Mental Measurements Yearbook published by the University of Nebraska Press. This publication contains information on over 1,000 tests and includes descriptions of the tests, reviews of their reliability and validity, and sources of the test themselves. The publication may be obtained by writing the University of Nebraska Press, 901 North 17th Street, Lincoln, Nebraska, 68588.

STUDENT EVALUATION STANDARDS

This section of the Standards pertains to three minimum requirements:

- o Evaluating student performance.
- o Recording student performance.
- o Establishment and maintenance of a permanent Student Master Record form.

STUDENT EVALUATION

Students shall be evaluated throughout training to assess their progress towards attainment of the instructional objectives of each of the Curriculum Unit Standards. In addition to these periodic evaluations, students must be evaluated comprehensively immediately before their first on-street training sessions and immediately before graduation.

Student evaluation serves many purposes, including the following:

- o To advise students of progress or lack of progress so that those who are not going to meet Graduation Standards can be advised at the earliest opportunity. This is required so that students may make an informed decision as to whether they wish to continue with the course.
- o To identify students needing remedial instruction. All students will learn at different rates depending on their ability and aptitude for specific subjects. Students who are experiencing difficulty but who possess the necessary aptitude for mastering course requirements must be provided with a reasonable amount of remedial instruction.

STUDENT RECORDS

A file must be established and maintained for each student enrolled in training. The file is required to provide school administrators and instructors with a means of (1) readily determining the status of each student during the course, and (2) furnishing information to employers inquiring about a former student. A good recordkeeping system is an important adjunct to instruction and the school's placement service.

The file maintained for each student should include at a minimum the following:

Application Form-The original application form provides personal information often needed by instructors, administrators, and prospective employers. Maintaining applications on file makes it unnecessary for students to complete other forms addressing the same information.

Selection Forms-Copies of records compiled during the selection process should be maintained for use by school personnel and for making information available to prospective employers. Records that might be maintained in the file can include any tests taken during selection, copy of the student's driving record, and the physical examination record.

Training Records-Records compiled during instruction should be kept in the file. At a minimum, this would include the Student Master Record form, showing daily performance and test scores, results of unit tests, instructor reports or memos dealing with student performance or deportment, and written information provided by students.

Governmental Forms-A copy of forms filled out to meet State and Federal requirements (e.g., permit and license application forms) should be maintained in the file for purposes of verification and for assistance if it becomes necessary to prepare the form a second time.

Placement Forms-A copy of forms prepared for placement purposes, such as resumes or job application forms, should be maintained in the file so that they can be reproduced and forwarded to prospective employers.

Student Master Record Form-Used for recording student performance during the training program.

Check the State's recordkeeping requirements for tractor-trailer training schools to ensure full compliance. The Federal Trade Commission Regulations on recordkeeping may also be applicable.

Recordkeeping shall not cease with the student's graduation. Although records may be transferred to an inactive file, records compiled on former students should be maintained for at least 5 years to aid former students who are seeking new employment.

Recording Student Performance

The minimum requirements for student evaluation purposes are two forms - Duty Status Record (formerly called Driver's Daily Logbook) and Student Master Record.

Duty Status Record. All students shall be issued a Duty Status Record meeting the requirements of Part 395 of the Federal Motor Carrier Safety Regulations. Unit 5.3, "Hours of Service Requirements" shall be taught as early as possible in the training course. Thereafter, all students shall be

required to maintain records of all training throughout the remainder of the course, but for no longer than 30 days, whichever comes first. Each day, schools shall collect the original copy of the previous day's log from each student and critique it for completeness and accuracy and make it a part of the student's file. In no case shall students be allowed to participate in street lessons without a Duty Status Record in their possession in which all driving time and mileage shall be accurately recorded. These records shall be carefully audited by school management to ensure that all students have received the minimum required BTW time and mileage specified in the Graduation Standards.

Student Master Record. Each school is required to establish and maintain a Student Master Record (hereafter referred to as Master Record) as part of the student's permanent record file. This Master Record is used for

- o student progress throughout training.
- o student attitudes.
- o test scores.

Master Records for each student are to be completed by the instructor responsible for conducting training for that student (all or any portion thereof). A copy of a recommended Master Record format is presented at the end of this section.

Subjective Measures. Subjective measures of student performance, progress in attaining instructional objectives, and attitudes towards safe operation are taken by instructors throughout training. Each of these aspects of student performance is recorded on the Master Record to be retained by the school after training has been completed.

These subjective measures of student performance during training assist school administrators in

- o determining whether individual students will graduate.
- o advising prospective employers of student attitudes towards safe and efficient operation of tractor-trailers.

They assist instructors in

- o tailoring instruction to meet individual student needs.
- o conducting instruction in as efficient a manner as possible.

The procedures for rating student performance include the following:

- o Assessment of student progress.

- o Assessing student attitudes.
- o Recording of critical incidents.

Assessment of Student Progress - The assessment of student progress toward attainment of course objectives is indicated on pages 1 and 2 of the Master Record. Assessments are to occur following each day of training. If a student is absent, no entries are to be made on the Master Record. Each "day" is a day of student attendance, not a calendar day. If a student completes only a portion of daily training requirements due to illness, tardiness, etc., only those aspects of training completed should be assessed.

This approach to recording student performance permits the Master Record to be used regardless of the course scheduling option selected by the administrator or the student's attendance record. If desired, instructors may jointly assess each student's performance on completion of all daily training requirements.

Daily assessments are reviewed by the school administrator or chief instructor to determine the next day's training schedule for each student. The student's progress in achieving identified instructional objectives is recorded on pages 1 and 2 of the sample Master Record as follows:

A-indicates the student has achieved specific instructional objectives.

P-indicates the student is progressing satisfactorily, i.e., at a rate equivalent to other students and will achieve identified instructional objective.

R-indicates the student requires remedial training to attain instructional objectives.

N-indicates no training in instructional objective has been initiated due to training schedule, student absence, or alterations in training regimen. An N should be penciled lightly in each of these instances to remind the instructor of the training requirement. It should be erased and marked properly whenever training commences.

Instructors may refer to the checklists employed in each section of the curriculum for criteria used to determine whether or not the student is making satisfactory progress or has attained instructional objectives. The school administrator should periodically review instructors' use of ratings to ensure that proper rating criteria are being applied. This can be accomplished by

- o supervising the daily rating process.
- o periodically reviewing completed ratings.

- o requiring teams of instructors to determine ratings.
- o cross checking ratings with other instructors.

Assessing Student Attitudes - Student attitude is assessed, using the form on page 5, at the end of training by all instructors. The results of the assessment are entered on the Master Record as numerical ratings for each of the five factors identified.

A rating scale of 1 to 5 is used on the sample Master Record. High ratings indicate proper attitudes; low ratings, improper attitudes. Ratings may be determined in one of two ways:

Group Ratings-The school administrator and instructors can decide upon individual ratings in a group meeting. Using this approach, the administrator would review all comments with instructors and decide upon the most appropriate rating. Care must be taken to ensure

- o rating process is not unduly influenced by one instructor or an instructor's personal biases.
- o rating values derived are based upon written comments and not a general impression of the student or behavior outside of class which does not affect in-class behavior.

Individual Ratings-If preferable, the administrator may have instructors rate student attitudes individually and then average the results to derive a single rating value. The advantage of this approach is that it prohibits an instructor from swaying opinions. A disadvantage is that it is more difficult to ensure that instructors are using proper rating criteria.

Recording of Critical Incidents - The student's general attitude is assessed at the end of training prior to determing graduation status by reviewing the entries on pages 3 and 4 of the Master Record. Throughout training, instructors indicate on this form any noted evidence of improper attitudes including the following:

Learning-Unwillingness to participate in instructional programs, lack of interest in applying knowledges acquired during instruction, lack of interest in general, etc.

Classroom Conduct-Overall deportment in class including such behavior as sleeping, tardiness, inattention, disruptive behavior, and disobeying of instructions.

Instructors-Lack of respect for individual instructors or the instructional process.

Safety and Efficiency-Evidenced by willful abuse of equipment, violation of safe operating principles, school safety requirements, etc.

Comments regarding student behavior indicative of proper or improper attitudes are made on a regular basis as specific instances occur. Entries should describe as accurately as possible the specific behavior observed; instructors should refrain from using such terms as "bad attitude" or "generally lazy." The following are examples of the kinds of entries that should be made:

- "Student arrived 20 minutes late for class with no valid excuse."
- "Student exceeded range speed limit by 15 mph."
- "Student refused to answer instructor's question."

Recording of Tests - All test and quiz scores should be entered by the instructor responsible for administering the tests on page 6 of the Master Record.

Maintaining a Student File

The Master Record is to be retained in the chief instructor's file for daily referral and updating.

Others items may be inserted in the student's file in the School Administration Office.

STUDENT NAME: _____
(Last, First, Middle Initial)

CODE: A - Achieved instructional objectives
P - Progressing satisfactorily
R - Remedial training needed
N - No training to date

STUDENT MASTER RECORD
STUDENT'S PROGRESS

TRAINING DAY

Instructor's Name

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
BASIC CONTROL																					
Acceleration																					
Braking																					
Shifting																					
Uphill operation																					
Downhill operation																					
Speed adjustment/curves																					
Lane keeping/straight																					
COMMUNICATION																					
Signaling direction changes																					
Cancelling signals																					
VISUAL SEARCH																					
Distance scanning																					
Intersection scanning																					
Mirror usage/scanning																					
Mirror usage/speed-direction changes																					
SPACE MANAGEMENT																					
Following distance																					
Space cushion																					
Return to lane																					
Gap judgment																					
LANE USE																					
Upgrades																					
Multilane roads																					
Turns																					
NIGHT OPERATION																					
Use of hi/lo beams																					
Speed adjustment																					
Space management																					
TRAFFIC LAWS																					
Speed limits																					
Signs/signals																					
HAZARD RECOGNITION																					
Road conditions																					
Traffic conditions																					

Notes:

STUDENT NAME: _____
(Last, First, Middle Initial)

CODE: A - Achieved instructional objectives
P - Progressing satisfactorily
R - Remedial training needed
N - No training to date

STUDENT MASTER RECORD (Page 2)
STUDENT'S PROGRESS

TRAINING DAY

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Instructor's Name
BASIC CONTROL																					
Acceleration																					
Braking																					
Shifting																					
Uphill operation																					
Downhill operation																					
Speed adjustment/curves																					
Lane keeping/straight																					
COMMUNICATION																					
Signaling direction changes																					
Cancelling signals																					
VISUAL SEARCH																					
Distance scanning																					
Intersection scanning																					
Mirror usage/scanning																					
Mirror usage/speed-direction changes																					
SPACE MANAGEMENT																					
Following distance																					
Space cushion																					
Return to lane																					
Gap judgment																					
LANE USE																					
Upgrades																					
Multilane roads																					
Turns																					
NIGHT OPERATION																					
Use of hi/lo beams																					
Speed adjustment																					
Space management																					
TRAFFIC LAWS																					
Speed limits																					
Signs/signals																					
HAZARD RECOGNITION																					
Road conditions																					
Traffic conditions																					

Notes:

STUDENT MASTER RECORD
INSTRUCTOR COMMENTS

STUDENT NAME: _____
(Last, First, Middle Initial)

TRAINING DAY NUMBER	COMMENTS
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

Notes:

STUDENT MASTER RECORD (Page 4)
INSTRUCTOR COMMENTS

STUDENT NAME: _____
(Last, First, Middle Initial)

TRAINING DAY NUMBER	COMMENTS
21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	

Notes:

STUDENT NAME: _____
(Last, First, Middle Initial)

RATINGS: 5 = Excellent 3 = Average 1 = Poor
4 = Good 2 = Below Average 0 = Unsatisfactory

TRAINING DAY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Professionalism																				
Respect for																				
Motivation																				
Maturity																				
Safety																				

TRAINING DAY

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Professionalism																				
Respect for																				
Motivation																				
Maturity																				
Safety																				

Professionalism

- o Common courtesy/cooperation
- o Verbal expression
- o Personal appearance/bodily care
- o Cooperation with fellow students and instructors

Respect for

- o Vehicles
- o Equipment
- o Supplies
- o Facilities

Motivation

- o Initiative
- o Self estimation of ability
- o Attentiveness
- o Sincerity towards training

Maturity

- o Emotional self control
- o Honesty (with self)
- o Degree of exhibitionism
- o Arguing/complaining

Safety

- o Degree of risk taking or risk acceptance while driving on or around the vehicle

Notes:

STUDENT NAME: _____
(Last, First, Middle Initial)

STUDENT MASTER RECORD (Page 6)
TEST SCORES

TEST DATE	NAME OF TEST OR QUIZ GIVEN	PASSING SCORE	STUDENTS OWN SCORE	CLASS RANKING

Notes:

STUDENT GRADUATION STANDARDS

This section of the Standards pertains to minimum requirements for performance levels in course work and graduation tests.

GRADUATION REQUIREMENTS

Eligibility to graduate is based upon two factors:

- Performance in course work.
- Graduation tests.

Performance in Course Work

In order to graduate, students must satisfactorily perform all aspects of course work. Daily reports of student performance should be kept on Master Record as described under Student Evaluation Standards. The records should show that a student has achieved all of the objectives for the course before the student may be considered eligible for graduation.

The satisfactory completion of all course work also means that each student will have a minimum of both 38.5 hours BTW time and to have driven a cumulative 1,000 miles during this BTW street time. It should be noted that 38.5 hours BTW time and 1,000 miles of street instruction is based upon a 3 to 1 student/instructor ratio.

During the last four hours of unit 2.7 - "Proficiency Development: Safe Operating Procedures," schools have the option of conducting the on-street portion of their final examination test and the miles operated during the test may be counted as a part of the required minimum 1,000 miles.

Graduation Tests (Final Examination Test Battery)

The final examination test battery will consist of the following parts:

- Part A - Written Knowledge Test
- Part B - Driving Range Test
- Part C - Street Test

The items that make up the tests are drawn from the instructional objectives specified in the Curriculum Unit Standards. Any student who has

met these instructional objectives successfully should be capable of attaining at least a passing score on each of these tests. The complete tests and scoring criteria for each will be finalized during curriculum validation and will be added to this Standard.

STUDENT TRAINING CERTIFICATION

Under the Standards, drivers who graduate must be issued a certificate showing evidence of achievement of the instructional objectives as set forth in the Student Training Certification System portion of these Standards.

To aid students in obtaining employment with a motor carrier, schools must issue a Training Certificate to students who have fulfilled the requirements for graduation.

LICENSING EXAMINATION (Optional)

As part of graduation, schools should (recommended but not mandatory) provide students with assistance in meeting licensing requirements imposed by the State in which they reside. While the issuance of a license to operate a tractor-trailer is outside the scope of training, it is reasonable to expect schools to assist students through certification, preparation for the licensing test, school-administered testing and use of school equipment.

School Certification

In some States, drivers who are certified as proficient by a recognized/certified school or motor carrier are not required to take the road test portion of the State driver license examination. In certifying a graduate for licensing, the school is accepting a responsibility toward the graduate and the general public that qualifications have been objectively and thoroughly assessed.

Preparation

Schools should provide all legitimate forms of assistance available to students in helping them to prepare for the State license test. Such assistance includes the following:

Information on State Requirements-Students should be fully informed as to the nature of licensing requirements. This can be done by incorporating into the course any information that the State makes available concerning the test, including any manual that the State provides for licensing of tractor-trailer operators.

Pre-testing-In some schools, the final street test is administered by someone other than an instructor. This not only enhances the objectivity of the test but gives students the experience of taking a test administered by someone with whom they are not acquainted.

Route Familiarization-Students may practice operating over the test route employed by license examiners as long as they are given no more information concerning the test than would be available to the general public. An opportunity to drive over the test routes allows students to concentrate more on safe operating practices and less upon destination-finding than would be possible if they were unfamiliar with the route.

School Administered Tests

Some States permit examiners to come to the school and administer the tests to students in a group to reduce the manpower and burden upon license facilities. Where a written test must be taken to obtain a learner's permit, having the test administered at the school is less disruptive of the school schedule. Where school-administered tests are permitted, it is of benefit to the school, the student, and the licensing station to make the necessary arrangements.

Equipment

In order to take a road test, students must have a vehicle available. Most States will also require a licensed operator to drive the vehicle to the licensing station and, if the student fails the examination, drive it back. Providing a vehicle and a licensed operator (e.g., assistant instructor) is a service the school should be expected to provide.

Notes:

STUDENT PLACEMENT STANDARDS

This section of the Standards pertains to minimum student placement standards:

- o Student counseling
- o Employer (Motor Carrier) relations
- o Employment records

These Standards only require some form of student counseling and some form of employment records. It is up to the individual schools to determine what works best for them and is in the best interests of their students. Therefore, the following is advisory only and NOT mandatory.

STUDENT COUNSELING

A portion of the curriculum is devoted to providing students assistance in seeking suitable employment (unit 5.7). However, this instruction can only address the collective needs of students. A counseling program is needed to help students take account of their individual strengths and weaknesses in seeking employment. Counseling should deal with the student's employability and employment opportunities that are available.

Students should be given an objective appraisal of their employability before they spend time seeking positions. This appraisal will (1) help guide them to suitable employers, (2) help them to recognize positions, conditions, and salary appropriate to their situation, and (3) enable them to present themselves in the best possible light.

Preparation for Interviews

In unit 5.7 students will have an opportunity to practice interviews. During the counseling session, the more practical aspects of interviews can be handled, including:

- o Helping students to arrange interviews.
- o Assisting students in preparing application forms.
- o Furnishing the students with records to take with them.
- o Giving guidance in preparing application forms.

EMPLOYER RELATIONS

The ability of a school to place its students depends greatly upon the type of relationship it maintains with various fleets in the vicinity. Building a good relationship with fleets involves providing access to records, arranging site visits, and scheduling on-site interviews.

Access to Records

Schools should provide access to complete records of student attendance and achievement. Records that may be furnished include:

Student Master Record-A record of student attendance containing daily records of progress, results of in-course and graduation tests, and instructor comments.

Background Information-Background information gathered during the selection process, a copy of the student application, and a student resume.

Outside Records-Any records obtained by the school prior to or during admission, e.g., driver record, certificate of physical examination.

Any records requested should be provided as expeditiously as possible.

EMPLOYMENT RECORDS

Schools cannot be expected to keep track of their former students, particularly in view of the high mobility of tractor-trailer drivers. However, student records should, if possible, record the first job obtained by former students. Such an employment record would allow schools to

- identify type of employers and specific employers that represent the best placement prospects for students.
- determine and document its placement rate.

STUDENT TRAINING CERTIFICATION (DOCUMENTATION) SYSTEM

No motor carrier shall permit a driver to operate a motor vehicle in interstate or foreign commerce, unless that driver has first been certified as having met all the requirements of these Standards; or at least the portions thereof which are applicable to the duties to which the driver will be assigned.

RESPONSIBILITIES

The responsibility for assuring that drivers are adequately trained to perform their duties lies with the motor carrier. It shall be the responsibility of each regulated motor carrier to

- obtain a written certificate describing training completed by the driver and the driver's status relative to minimum Graduation Standards.
- compare training completed within these Standards and the intended job duties of the new driver applicant to ensure that the driver is qualified.
- maintain a copy of the certificate on file for the duration of the driver's employment and make it available to authorized State and Federal officials.

To fulfill certification responsibilities, the motor carrier shall require prospective drivers to furnish written documents certifying training completed.

CONTENT

The manner in which training must be certified varies as a function of the nature and amount of the driver's experience. Separate certification requirements are imposed upon the following three categories of drivers:

- Persons who have completed the full Curriculum Unit Standards and met the minimum Graduation Standards.
- Persons who have only completed one (or more) of the Curriculum Unit Standards.
- Persons who because of prior experience and/or training have not completed the Curriculum Unit Standards but who have taken and passed the Final Examination Test Battery as specified in the Graduation Standards.

Instruction. Drivers must be certified as having attained instructional objectives and hours of instruction for each unit of instruction that is applicable to the duties to which they will be assigned. The certificate shall indicate each unit of instruction, as specified in the Standards, in which students have completed minimum hour requirements and have exhibited satisfactory performance, as assessed through instructor evaluation and in-course tests. The certificate will also indicate instruction on Special Rigs (Unit 1.9) sufficient to permit attainment of instructional objectives applicable to any such rig, including operation, instruction, coupling and uncoupling, maintenance, and loading.

Graduation Standards. In addition to receiving required instruction, drivers must have fulfilled minimum standards of proficiency. Attainment of proficiency must be assessed through the administration of the Graduation Standards (the Final Examination Test Battery). The certificate must indicate whether the applicant has met the required Standards.

Partial Fulfillment of Requirements. Drivers need not fulfill all requirements set forth in these Standards to receive a training certificate. Each school will provide, upon request of the student, a certificate indicating those Curriculum Unit Standards fulfilled. This will allow students to combine instruction received at two or more schools in fulfilling the requirements of these training Standards.

TRAINING CERTIFICATE FORMAT

No specific certification format is required. Any format used must, however, meet the following requirements:

Training Certification-The format must indicate all of the Curriculum Unit Standards, as specified in the Standards, completed by the driver.

Proficiency Certification-The form must indicate level of performance in meeting the Graduation Standards.

Driver Identification-The driver for whom the certificate has been prepared must be positively identified through (1) full name, (2) date of birth, and (3) social security or driver license number.

Identification of Certifying Agency-The agency responsible for certifying must be identified by name and address.

Signature-Each certificate will be signed by an individual within the certifying agency authorized to represent the agency for purposes of certification.

Security-The certificate itself must be designed to prevent tampering, using one or more of the following:

- Photographic reproduction, security paper, or other materials that will reveal attempts to alter contents.
- An embossed or otherwise unreproducible seal placed over a critical item of content e.g., total hours completed.

All certificates must have serial numbers that correspond to the student's Master Record. A sample format appears on the following page.

CERTIFICATION AUTHORITY

The authority to certify fulfillment of training requirements is limited to schools and motor carrier employers.

For purposes of the certification system, a "school" is any organization that provides a formal program of training and/or testing to tractor-trailer drivers, including:

- Schools operated by for-hire and private motor carriers.
- Colleges, universities, and vocational schools.
- Business organizations devoted to training or testing.

An "employer" must be a motor carrier engaged in operations involving the use of tractor-trailer combinations.

Schools and employers may certify only that instruction or experience which they have directly provided. They cannot certify qualifications based upon training or experience received at another organization.

LIMITS OF CERTIFICATION

Reviewing a person's training certificate is necessary but not sufficient to establish the qualifications of drivers. Nothing in the certification system relieves any motor carrier of the responsibility to ensure that a driver is fully qualified for the duties to be performed. Motor carriers should administer their own measures of qualification including, at a minimum, the road test required under Part 391 of the Federal Motor Carrier Safety Regulations.

Each motor carrier must take reasonable care to validate training certificates before drivers are permitted to operate. For certificates issued by schools, recommended methods of validation include (1) obtaining and reviewing the school's syllabus, (2) checking with the State agency controlling schools (Department of Motor Vehicles, Department of Education) for accreditation, record of complaints, etc., and (3) checking with other carriers who have employed graduates of a particular school.

TRAINING CERTIFICATE NUMBER (Serial Numbered)

DRIVER

Name: _____ Date of Birth: _____

Address: _____ (Number and Street) _____ (State) _____ (Zip)

_____ (Social Security Number) _____ (Driver License Number) _____ (State)

TRAINING OR EXPERIENCE

The driver has met all training objectives for the Curriculum Unit Standards on dates shown below:

Basic Control

_____ Control Systems
_____ Vehicle Inspection
_____ Basic Control
_____ Shifting
_____ Backing
_____ Coupling/Uncoupling
_____ Proficiency Development
_____ Special Rigs

Safe Operating Practices

_____ Visual Search
_____ Communication
_____ Speed Management
_____ Space Management
_____ Night Operation
_____ Extreme Driving Conditions
_____ Proficiency Development

Advanced Operation Practices

_____ Hazard Perception
_____ Emergency Maneuvers
_____ Skid Control/Recovery

Vehicle Maintenance

_____ Vehicle Systems
_____ Preventive Maintenance and Servicing
_____ Diagnosing and Reporting Malfunctions

Nonvehicle Activities

_____ Handling Cargo
_____ Cargo Documentation
_____ Hours of Service
_____ Accident Procedures
_____ Personal Health & Safety
_____ Trip Planning
_____ Public & Employer Relations

Total Hours Driven: _____ Total Hours Observation: _____ Total Miles Driven: _____

SPECIAL VEHICLES

The driver has met Training Standards for the specific equipment shown below:

Description: _____

_____

GRADUATION STANDARDS

The driver has fulfilled the Graduation Standards on dates shown below:

Written Test on: _____ Range Test on: _____ Street Test on: _____

BASIS OF CERTIFICATION (Checked below):

A ☐ Completed all of the Curriculum Unit Standards and Graduation Standards

B. ☐ Completed and met all the requirements of only the Curriculum Unit Standards shown

C. ☐ Completed and met all of the Graduation Standards only (Had no training)

CERTIFYING AUTHORITY

_____
(Organization)

_____ _____ _____
(Authorized Individual) (Position) (Signature)

_____
(Street Address) (City) (State) (Zip Code)

_____ _____ _____
(Telephone Number) (Area Code) (Date)

INSTRUCTIONS FOR PREPARING TRAINING CERTIFICATES

DRIVER

Name: Enter full legal name.

Date of Birth: Enter date of birth as obtained from driver's license or other official document.

Address: Enter the address of the individual at the time the form is prepared.

Social Security Number: Enter social security number.

Driver License Number and State: Enter the driver license number and the state in which the driver is licensed.

TRAINING OR EXPERIENCE

Units: Enter the date in front of each Curriculum Unit Standard for which the driver has met all of the performance, knowledge, and skill objectives as specified in the Standards. For those not completed enter "N.C." in the space.

Total Hours: Enter the total number of hours of behind-the-wheel time the student has received, total hours observation time (in cab) not driving and the total number of miles the student accumulated while behind-the-wheel.

Special Vehicles: List any other special vehicles that the driver has qualified to operate safely, such as tankers or double bottoms.

Graduation Standards: If the student has been administered the Final Examination Test Battery and has met the minimum proficiency standards, as specified in the Test Battery, enter the dates for each completion date.

Basis of Certification: Check the box that shows why this Training Certificate is being issued.

CERTIFYING AUTHORITY

Organization: The name of the school of company responsible for providing the training/experience documented in the Training Certificate.

Address: Complete mailing address of the organization.

Authorized Individual:	The name of the individual authorized to prepare Training Certificate.
Position:	The official position of the individual within the certifying organization.
Signature:	The handwritten signature of the authorized individual.
Date:	Date on which the Training Certificate was prepared.

MISCELLANEOUS STANDARDS

This portion of these Standards pertains to those items not specifically dealt with elsewhere in these Standards.

1. Any tractor-trailer driver training program that meets or exceeds all of the requirements contained in these Standards will be in compliance with these Standards if

   A. at least 85 percent of all students graduating from such a course of instruction can successfully pass the Final Examination Test Battery contained in the Graduation Standards behind the wheel.

   B. all students are receiving the minimum required behind-the-wheel training time and the minimum amount of miles required.

2. Schools shall have the option of using the accompanying "Model Curriculum for Training Tractor-Trailer Drivers" or developing their own curriculums, provided such curriculums meet or exceed these Training Standards.

3. Schools need teach only that portion of these Standards that are applicable to their geographic location, i.e., a school in the southeast is not required to teach skid pan training or mountain driving. However, the Training Certificates issued to their graduates must reflect that fact. Motor carriers who employ such students may <u>not</u> give such employees these types of driving assignments (if they involve interstate or foreign commerce) until the employer (motor carrier) has either (1) given this training or, (2) caused the employee to attend another school to make up the required training. In either case the make-up training must meet all of the requirements of the applicable Curriculum Unit Standards before the employer certifies the employee as qualified to operate (on this type of driving assignment) in interstate or foreign commerce, as required by Part 391 of the Federal Motor Carrier Safety Regulations.

4. A "captive" motor carrier school, i.e., an in-house school run solely for purposes of training new employees for the motor carrier "parent," shall only be required to teach that portion of these Standards that are applicable to the motor carrier's own operations, provided such training meets all of the requirements of each applicable Curriculum Unit Standard.

   An employee who subsequently leaves such a motor carrier shall be issued a Training Certificate (meeting the requirements of the Student Training Certification System) which shall clearly indicate all training deficits. A subsequent employer may <u>not</u> give these employees driving assignments (involving interstate or

foreign commerce) unless or until the employer (motor carrier) has either (1) given this training or, (2) caused the employee to attend another school to make up the missing training. In either case, the make-up training must meet all requirements of the the applicable Curriculum Unit Standards before the employer certifies the employee as qualified to operate in interstate or foreign commerce, as required by Part 391 of the Federal Motor Carrier Safety Regulations.

5. No motor carrier shall certify a person as qualified to operate in interstate or foreign commerce until the driver applicant shall have met the following conditions:

   A. Has already been employed as a driver, certified to operate in interstate and foreign commerce under Part 391 of the Federal Motor Carrier Safety Regulations as of January 1, 1986 (or some such future date - thus "grandfathering" in all of the presently certified drivers).

   B. The driver applicant has a Training Certificate indicating that the bearer of such certificate has successfully completed a tractor-trailer driver training course which meets all requirements of these Standards.

   C. In the case of drivers entering the interstate/foreign commerce stream as a new driver, i.e., Part B above, the employer (motor carrier) shall apply all tests as required by Part 391 of the Federal Motor Carrier Safety Regulations and shall also give post-graduate training to such a driver applicant, as specified in Part 6 of the Miscellaneous Standards.

6. Post-graduate training shall be given by all employers (motor carriers) to driver applicants not already certified to operate in interstate/foreign commerce. Such post-graduate training is required because completion of these Standards does <u>not</u> automatically make a person a fully experienced tractor-trailer driver. The objective of these Standards is to provide its graduates with the basic knowledge/skills necessary to develop into a professional driver. Graduates will therefore require an additional period of time to refine their skills before they are ready to be used as solo drivers, i.e., to be dispatched on trips by themselves. Depending upon the learning ability of the graduate and/or the quality of the training program that he/she graduated from, the individual may require anywhere from 2 days to 3 weeks time to refine their skills, in addition to learning all of the required knowledge/ skills required by the type/nature of the employer's (motor carrier) own operation. Post-graduate training shall be accomplished as follows:

   All such graduates shall be assigned to ride with one of the motor carrier's professional drivers for a day (work shift) to become familiar with the equipment, type of cargo and operation and paperwork requirements.

Thereafter, such graduates shall be assigned to do all of the driving for one of the motor carrier's professional drivers until this professional driver shall indicate to the supervisor that the person is ready to solo. The supervisor shall test such graduates to determine that they are ready to solo and shall assign them to easier runs or trips until they have demonstrated the capability of undertaking a full range of assignments.

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Notes: